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## BOOK REVIEWS

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Milton Friedman

## THE ROLE OF MONETARY POLICY*

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There is wide agreement about the major goals of economic policy: high employment, stable prices, and rapid growth. There is less agreement that these goals are mutually compatible or, among those who regard them as incompatible, about the terms at which they can and should be substituted for one another. There is least agreement about the role that various instruments of policy can and should play in achieving the several goals.

My topic for tonight is the role of one such instrument—monetary policy. What can it contribute? And how should it be conducted to contribute the most? Opinion on these questions has fluctuated widely. In the first flush of enthusiasm about the newly created Federal Reserve System, many observers attributed the relative stability of the 1920s to the System's capacity for fine tuning—to apply an apt modern term. It came to be widely believed that a new era had arrived in which business cycles had been rendered obsolete by advances in monetary technology. This opinion was shared by economist and layman alike, though, of course, there were some dissonant voices. The Great Contraction destroyed this naive attitude. Opinion swung to the other extreme. Monetary policy was a string. You could pull on it to stop inflation but you could not push on it to halt recession. You could lead a horse to water but you could not make him drink. Such theory by aphorism was soon replaced by Keynes' rigorous and sophisticated analysis.

Keynes offered simultaneously an explanation for the presumed impotence of monetary policy to stem the depression, a nonmonetary interpretation of the depression, and an alternative to monetary policy

for meeting the depression and his offering was avidly accepted. If liquidity preference is absolute or nearly so—as Keynes believed likely in times of heavy unemployment—interest rates cannot be lowered by monetary measures. If investment and consumption are little affected by interest rates—as Hansen and many of Keynes' other American disciples came to believe—lower interest rates, even if they could be achieved, would do little good. Monetary policy is twice damned. The contraction, set in train, on this view, by a collapse of investment or by a shortage of investment opportunities or by stubborn thriftiness, could not, it was argued, have been stopped by monetary measures. But there was available an alternative—fiscal policy. Government spending could make up for insufficient private investment. Tax reductions could undermine stubborn thriftiness.

The wide acceptance of these views in the economics profession meant that for some two decades monetary policy was believed by all but a few reactionary souls to have been rendered obsolete by new economic knowledge. Money did not matter. Its only role was the minor one of keeping interest rates low, in order to hold down interest payments in the government budget, contribute to the "euthanasia of the rentier," and maybe, stimulate investment a bit to assist government spending in maintaining a high level of aggregate demand.

These views produced a widespread adoption of cheap money policies after the war. And they received a rude shock when these policies failed in country after country, when central bank after central bank was forced to give up the pretense that it could indefinitely keep "the" rate of interest at a low level. In this country, the public denouement came with the Federal Reserve-Treasury Accord in 1951, although the policy of pegging government bond prices was not formally abandoned until 1953. Inflation, stimulated by cheap money policies, not the widely heralded postwar depression, turned out to be the order of the day. The result was the beginning of a revival of belief in the potency of monetary policy.

This revival was strongly fostered among economists by the theoretical developments initiated by Haberler but named for Pigou that pointed out a channel—namely, changes in wealth—whereby changes in the real quantity of money can affect aggregate demand even if they do not alter interest rates. These theoretical developments did not undermine Keynes' argument against the potency of orthodox monetary measures when liquidity preference is absolute since under such circumstances the usual monetary operations involve simply substituting money for other assets without changing total wealth. But they did show how changes in the quantity of money produced in other ways could affect total spending even under such circumstances. And, more

fundamentally, they did undermine Keynes' key theoretical proposition, namely, that even in a world of flexible prices, a position of equilibrium at full employment might not exist. Henceforth, unemployment had again to be explained by rigidities or imperfections, not as the natural outcome of a fully operative market process.

The revival of belief in the potency of monetary policy was fostered also by a re-evaluation of the role money played from 1929 to 1933. Keynes and most other economists of the time believed that the Great Contraction in the United States occurred despite aggressive expansionary policies by the monetary authorities—that they did their best but their best was not good enough.[1] Recent studies have demonstrated that the facts are precisely the reverse: the U.S. monetary authorities followed highly deflationary policies. The quantity of money in the United States fell by one-third in the course of the contraction. And it fell not because there were no willing borrowers—not because the horse would not drink. It fell because the Federal Reserve System forced or permitted a sharp reduction in the monetary base, because it failed to exercise the responsibilities assigned to it in the Federal Reserve Act to provide liquidity to the banking system. The Great Contraction is tragic testimony to the power of monetary policy—not, as Keynes and so many of his contemporaries believed, evidence of its impotence.

In the United States the revival of belief in the potency of monetary policy was strengthened also by increasing disillusionment with fiscal policy, not so much with its potential to affect aggregate demand as with the practical and political feasibility of so using it. Expenditures turned out to respond sluggishly and with long lags to attempts to adjust them to the course of economic activity, so emphasis shifted to taxes. But here political factors entered with a vengeance to prevent prompt adjustment to presumed need, as has been so graphically illustrated in the months since I wrote the first draft of this talk. "Fine tuning" is a marvelously evocative phrase in this electronic age, but it has little resemblance to what is possible in practice—not, I might add, an unmixed evil.

It is hard to realize how radical has been the change in professional opinion on the role of money. Hardly an economist today accepts views that were the common coin some two decades ago. Let me cite a few examples.

In a talk published in 1945, E. A. Goldenweiser, then Director of the Research Division of the Federal Reserve Board, described the primary objective of monetary policy as being to "maintain the value of Government bonds. . . . This country" he wrote, "will have to adjust to

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[1] In [2], I have argued that Henry Simons shared this view with Keynes, and that it accounts for the policy changes that he recommended.

a 2½ per cent interest rate as the return on safe, long-time money, because the time has come when returns on pioneering capital can no longer be unlimited as they were in the past" [4, p. 117].

In a book on *Financing American Prosperity*, edited by Paul Homan and Fritz Machlup and published in 1945, Alvin Hansen devotes nine pages of text to the "savings-investment problem" without finding any need to use the words "interest rate" or any close facsimile thereto [5, pp. 218-27]. In his contribution to this volume, Fritz Machlup wrote, "Questions regarding the rate of interest, in particular regarding its variation or its stability, may not be among the most vital problems of the postwar economy, but they are certainly among the perplexing ones" [5, p. 466]. In his contribution, John H. Williams—not only professor at Harvard but also a long-time adviser to the New York Federal Reserve Bank—wrote, "I can see no prospect of revival of a general monetary control in the postwar period" [5, p. 383].

Another of the volumes dealing with postwar policy that appeared at this time, *Planning and Paying for Full Employment*, was edited by Abba P. Lerner and Frank D. Graham [6] and had contributors of all shades of professional opinion—from Henry Simons and Frank Graham to Abba Lerner and Hans Neisser. Yet Albert Halasi, in his excellent summary of the papers, was able to say, "Our contributors do not discuss the question of money supply. . . . The contributors make no special mention of credit policy to remedy actual depressions. . . . Inflation . . . might be fought more effectively by raising interest rates. . . . But . . . other anti-inflationary measures . . . are preferable" [6, pp. 23-24]. *A Survey of Contemporary Economics*, edited by Howard Ellis and published in 1948, was an "official" attempt to codify the state of economic thought of the time. In his contribution, Arthur Smithies wrote, "In the field of compensatory action, I believe fiscal policy must shoulder most of the load. Its chief rival, monetary policy, seems to be disqualified on institutional grounds. This country appears to be committed to something like the present low level of interest rates on a long-term basis" [1, p. 208].

These quotations suggest the flavor of professional thought some two decades ago. If you wish to go further in this humbling inquiry, I recommend that you compare the sections on money—when you can find them—in the Principles texts of the early postwar years with the lengthy sections in the current crop even, or especially, when the early and recent Principles are different editions of the same work.

The pendulum has swung far since then, if not all the way to the position of the late 1920s, at least much closer to that position than to the position of 1945. There are of course many differences between then and now, less in the potency attributed to monetary policy than in the

roles assigned to it and the criteria by which the profession believes monetary policy should be guided. Then, the chief roles assigned monetary policy were to promote price stability and to preserve the gold standard; the chief criteria of monetary policy were the state of the "money market," the extent of "speculation" and the movement of gold. Today, primacy is assigned to the promotion of full employment, with the prevention of inflation a continuing but definitely secondary objective. And there is major disagreement about criteria of policy, varying from emphasis on money market conditions, interest rates, and the quantity of money to the belief that the state of employment itself should be the proximate criterion of policy.

I stress nonetheless the similarity between the views that prevailed in the late 'twenties and those that prevail today because I fear that, now as then, the pendulum may well have swung too far, that, now as then, we are in danger of assigning to monetary policy a larger role than it can perform, in danger of asking it to accomplish tasks that it cannot achieve, and, as a result, in danger of preventing it from making the contribution that it is capable of making.

Unaccustomed as I am to denigrating the importance of money, I therefore shall, as my first task, stress what monetary policy cannot do. I shall then try to outline what it can do and how it can best make its contribution, in the present state of our knowledge—or ignorance.

## I. *What Monetary Policy Cannot Do*

From the infinite world of negation, I have selected two limitations of monetary policy to discuss: (1) It cannot peg interest rates for more than very limited periods; (2) It cannot peg the rate of unemployment for more than very limited periods. I select these because the contrary has been or is widely believed, because they correspond to the two main unattainable tasks that are at all likely to be assigned to monetary policy, and because essentially the same theoretical analysis covers both.

### *Pegging of Interest Rates*

History has already persuaded many of you about the first limitation. As noted earlier, the failure of cheap money policies was a major source of the reaction against simple-minded Keynesianism. In the United States, this reaction involved widespread recognition that the wartime and postwar pegging of bond prices was a mistake, that the abandonment of this policy was a desirable and inevitable step, and that it had none of the disturbing and disastrous consequences that were so freely predicted at the time.

The limitation derives from a much misunderstood feature of the relation between money and interest rates. Let the Fed set out to keep

interest rates down. How will it try to do so? By buying securities. This raises their prices and lowers their yields. In the process, it also increases the quantity of reserves available to banks, hence the amount of bank credit, and, ultimately the total quantity of money. That is why central bankers in particular, and the financial community more broadly, generally believe that an increase in the quantity of money tends to lower interest rates. Academic economists accept the same conclusion, but for different reasons. They see, in their mind's eye, a negatively sloping liquidity preference schedule. How can people be induced to hold a larger quantity of money? Only by bidding down interest rates.

Both are right, up to a point. The *initial* impact of increasing the quantity of money at a faster rate than it has been increasing is to make interest rates lower for a time than they would otherwise have been. But this is only the beginning of the process not the end. The more rapid rate of monetary growth will stimulate spending, both through the impact on investment of lower market interest rates and through the impact on other spending and thereby relative prices of higher cash balances than are desired. But one man's spending is another man's income. Rising income will raise the liquidity preference schedule and the demand for loans; it may also raise prices, which would reduce the real quantity of money. These three effects will reverse the initial downward pressure on interest rates fairly promptly, say, in something less than a year. Together they will tend, after a somewhat longer interval, say, a year or two, to return interest rates to the level they would otherwise have had. Indeed, given the tendency for the economy to overreact, they are highly likely to raise interest rates temporarily beyond that level, setting in motion a cyclical adjustment process.

A fourth effect, when and if it becomes operative, will go even farther, and definitely mean that a higher rate of monetary expansion will correspond to a higher, not lower, level of interest rates than would otherwise have prevailed. Let the higher rate of monetary growth produce rising prices, and let the public come to expect that prices will continue to rise. Borrowers will then be willing to pay and lenders will then demand higher interest rates—as Irving Fisher pointed out decades ago. This price expectation effect is slow to develop and also slow to disappear. Fisher estimated that it took several decades for a full adjustment and more recent work is consistent with his estimates.

These subsequent effects explain why every attempt to keep interest rates at a low level has forced the monetary authority to engage in successively larger and larger open market purchases. They explain why, historically, high and rising nominal interest rates have been associated

with rapid growth in the quantity of money, as in Brazil or Chile or in the United States in recent years, and why low and falling interest rates have been associated with slow growth in the quantity of money, as in Switzerland now or in the United States from 1929 to 1933. As an empirical matter, low interest rates are a sign that monetary policy *has been* tight—in the sense that the quantity of money has grown slowly; high interest rates are a sign that monetary policy *has been* easy—in the sense that the quantity of money has grown rapidly. The broadest facts of experience run in precisely the opposite direction from that which the financial community and academic economists have all generally taken for granted.

Paradoxically, the monetary authority could assure low nominal rates of interest—but to do so it would have to start out in what seems like the opposite direction, by engaging in a deflationary monetary policy. Similarly, it could assure high nominal interest rates by engaging in an inflationary policy and accepting a temporary movement in interest rates in the opposite direction.

These considerations not only explain why monetary policy cannot peg interest rates; they also explain why interest rates are such a misleading indicator of whether monetary policy is "tight" or "easy." For that, it is far better to look at the rate of change of the quantity of money.[2]

### Employment as a Criterion of Policy

The second limitation I wish to discuss goes more against the grain of current thinking. Monetary growth, it is widely held, will tend to stimulate employment; monetary contraction, to retard employment. Why, then, cannot the monetary authority adopt a target for employment or unemployment—say, 3 per cent unemployment; be tight when unemployment is less than the target; be easy when unemployment is higher than the target; and in this way peg unemployment at, say, 3 per cent? The reason it cannot is precisely the same as for interest rates—the difference between the immediate and the delayed consequences of such a policy.

Thanks to Wicksell, we are all acquainted with the concept of a "natural" rate of interest and the possibility of a discrepancy between the "natural" and the "market" rate. The preceding analysis of interest rates can be translated fairly directly into Wicksellian terms. The monetary authority can make the market rate less than the natural rate

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[2] This is partly an empirical not theoretical judgment. In principle, "tightness" or "ease" depends on the rate of change of the quantity of money supplied compared to the rate of change of the quantity demanded excluding effects on demand from monetary policy itself. However, empirically demand is highly stable, if we exclude the effect of monetary policy, so it is generally sufficient to look at supply alone.

only by inflation. It can make the market rate higher than the natural
rate only by deflation. We have added only one wrinkle to Wicksell—
the Irving Fisher distinction between the nominal and the real rate of
interest. Let the monetary authority keep the nominal market rate for a
time below the natural rate by inflation. That in turn will raise the
nominal natural rate itself, once anticipations of inflation become wide-
spread, thus requiring still more rapid inflation to hold down the mar-
ket rate. Similarly, because of the Fisher effect, it will require not
merely deflation but more and more rapid deflation to hold the market
rate above the initial "natural" rate.

This analysis has its close counterpart in the employment market. At
any moment of time, there is some level of unemployment which has
the property that it is consistent with equilibrium in the structure of
*real* wage rates. At that level of unemployment, real wage rates are
tending on the average to rise at a "normal" secular rate, i.e., at a rate
that can be indefinitely maintained so long as capital formation, tech-
nological improvements, etc., remain on their long-run trends. A lower
level of unemployment is an indication that there is an excess demand
for labor that will produce upward pressure on real wage rates. A
higher level of unemployment is an indication that there is an excess
supply of labor that will produce downward pressure on real wage
rates. The "natural rate of unemployment," in other words, is the level
that would be ground out by the Walrasian system of general equilib-
rium equations, provided there is imbedded in them the actual struc-
tural characteristics of the labor and commodity markets, including
market imperfections, stochastic variability in demands and supplies,
the cost of gathering information about job vacancies and labor avail-
abilities, the costs of mobility, and so on.[3]

You will recognize the close similarity between this statement and
the celebrated Phillips Curve. The similarity is not coincidental. Phil-
lips' analysis of the relation between unemployment and wage change is
deservedly celebrated as an important and original contribution. But,
unfortunately, it contains a basic defect—the failure to distinguish be-
tween *nominal* wages and *real* wages—just as Wicksell's analysis failed
to distinguish between *nominal* interest rates and *real* interest rates.
Implicitly, Phillips wrote his article for a world in which everyone an-
ticipated that nominal prices would be stable and in which that antici-
pation remained unshaken and immutable whatever happened to actual
prices and wages. Suppose, by contrast, that everyone anticipates that
prices will rise at a rate of more than 75 per cent a year—as, for exam-

[3] It is perhaps worth noting that this "natural" rate need not correspond to equality
between the number unemployed and the number of job vacancies. For any given structure
of the labor market, there will be some equilibrium relation between these two magnitudes,
but there is no reason why it should be one of equality.

ple, Brazilians did a few years ago. Then wages must rise at that rate simply to keep real wages unchanged. An excess supply of labor will be reflected in a less rapid rise in nominal wages than in anticipated prices,[4] not in an absolute decline in wages. When Brazil embarked on a policy to bring down the rate of price rise, and succeeded in bringing the price rise down to about 45 per cent a year, there was a sharp initial rise in unemployment because under the influence of earlier anticipations, wages kept rising at a pace that was higher than the new rate of price rise, though lower than earlier. This is the result experienced, and to be expected, of all attempts to reduce the rate of inflation below that widely anticipated.[5]

To avoid misunderstanding, let me emphasize that by using the term "natural" rate of unemployment, I do not mean to suggest that it is immutable and unchangeable. On the contrary, many of the market characteristics that determine its level are man-made and policy-made. In the United States, for example, legal minimum wage rates, the Walsh-Healy and Davis-Bacon Acts, and the strength of labor unions all make the natural rate of unemployment higher than it would otherwise be. Improvements in employment exchanges, in availability of information about job vacancies and labor supply, and so on, would tend to lower the natural rate of unemployment. I use the term "natural" for the same reason Wicksell did—to try to separate the real forces from monetary forces.

Let us assume that the monetary authority tries to peg the "market" rate of unemployment at a level below the "natural" rate. For definiteness, suppose that it takes 3 per cent as the target rate and that the "natural" rate is higher than 3 per cent. Suppose also that we start out at a time when prices have been stable and when unemployment is higher than 3 per cent. Accordingly, the authority increases the rate of monetary growth. This will be expansionary. By making nominal cash

[4] Strictly speaking, the rise in nominal wages will be less rapid than the rise in anticipated nominal wages to make allowance for any secular changes in real wages.

[5] Stated in terms of the rate of change of nominal wages, the Phillips Curve can be expected to be reasonably stable and well defined for any period for which the *average* rate of change of prices, and hence the anticipated rate, has been relatively stable. For such periods, nominal wages and "real" wages move together. Curves computed for different periods or different countries for each of which this condition has been satisfied will differ in level, the level of the curve depending on what the average rate of price change was. The higher the average rate of price change, the higher will tend to be the level of the curve. For periods or countries for which the rate of change of prices varies considerably, the Phillips Curve will not be well defined. My impression is that these statements accord reasonably well with the experience of the economists who have explored empirical Phillips Curves.

Restate Phillips' analysis in terms of the rate of change of real wages—and even more precisely, anticipated real wages—and it all falls into place. That is why students of empirical Phillips Curves have found that it helps to include the rate of change of the price level as an independent variable.

balances higher than people desire, it will tend initially to lower interest rates and in this and other ways to stimulate spending. Income and spending will start to rise.

To begin with, much or most of the rise in income will take the form of an increase in output and employment rather than in prices. People have been expecting prices to be stable, and prices and wages have been set for some time in the future on that basis. It takes time for people to adjust to a new state of demand. Producers will tend to react to the initial expansion in aggregate demand by increasing output, employees by working longer hours, and the unemployed, by taking jobs now offered at former nominal wages. This much is pretty standard doctrine.

But it describes only the initial effects. Because selling prices of products typically respond to an unanticipated rise in nominal demand faster than prices of factors of production, real wages received have gone down—though real wages anticipated by employees went up, since employees implicitly evaluated the wages offered at the earlier price level. Indeed, the simultaneous fall *ex post* in real wages to employers and rise *ex ante* in real wages to employees is what enabled employment to increase. But the decline *ex post* in real wages will soon come to affect anticipations. Employees will start to reckon on rising prices of the things they buy and to demand higher nominal wages for the future. "Market" unemployment is below the "natural" level. There is an excess demand for labor so real wages will tend to rise toward their initial level.

Even though the higher rate of monetary growth continues, the rise in real wages will reverse the decline in unemployment, and then lead to a rise, which will tend to return unemployment to its former level. In order to keep unemployment at its target level of 3 per cent, the monetary authority would have to raise monetary growth still more. As in the interest rate case, the "market" rate can be kept below the "natural" rate only by inflation. And, as in the interest rate case, too, only by accelerating inflation. Conversely, let the monetary authority choose a target rate of unemployment that is above the natural rate, and they will be led to produce a deflation, and an accelerating deflation at that.

What if the monetary authority chose the "natural" rate—either of interest or unemployment—as its target? One problem is that it cannot know what the "natural" rate is. Unfortunately, we have as yet devised no method to estimate accurately and readily the natural rate of either interest or unemployment. And the "natural" rate will itself change from time to time. But the basic problem is that even if the monetary authority knew the "natural" rate, and attempted to peg the market rate at that level, it would not be led to a determinate policy. The "market" rate will vary from the natural rate for all sorts of reasons other than monetary policy. If the monetary authority responds to

these variations, it will set in train longer term effects that will make any monetary growth path it follows ultimately consistent with the rule of policy. The actual course of monetary growth will be analogous to a random walk, buffeted this way and that by the forces that produce temporary departures of the market rate from the natural rate.

To state this conclusion differently, there is always a temporary trade-off between inflation and unemployment; there is no permanent trade-off. The temporary trade-off comes not from inflation per se, but from unanticipated inflation, which generally means, from a rising rate of inflation. The widespread belief that there is a permanent trade-off is a sophisticated version of the confusion between "high" and "rising" that we all recognize in simpler forms. A rising rate of inflation may reduce unemployment, a high rate will not.

But how long, you will say, is "temporary"? For interest rates, we have some systematic evidence on how long each of the several effects takes to work itself out. For unemployment, we do not. I can at most venture a personal judgment, based on some examination of the historical evidence, that the initial effects of a higher and unanticipated rate of inflation last for something like two to five years; that this initial effect then begins to be reversed; and that a full adjustment to the new rate of inflation takes about as long for employment as for interest rates, say, a couple of decades. For both interest rates and employment, let me add a qualification. These estimates are for changes in the rate of inflation of the order of magnitude that has been experienced in the United States. For much more sizable changes, such as those experienced in South American countries, the whole adjustment process is greatly speeded up.

To state the general conclusion still differently, the monetary authority controls nominal quantities—directly, the quantity of its own liabilities. In principle, it can use this control to peg a nominal quantity—an exchange rate, the price level, the nominal level of national income, the quantity of money by one or another definition—or to peg the rate of change in a nominal quantity—the rate of inflation or deflation, the rate of growth or decline in nominal national income, the rate of growth of the quantity of money. It cannot use its control over nominal quantities to peg a real quantity—the real rate of interest, the rate of unemployment, the level of real national income, the real quantity of money, the rate of growth of real national income, or the rate of growth of the real quantity of money.

## II. *What Monetary Policy Can Do*

Monetary policy cannot peg these real magnitudes at predetermined levels. But monetary policy can and does have important effects on these real magnitudes. The one is in no way inconsistent with the other.

My own studies of monetary history have made me extremely sympathetic to the oft-quoted, much reviled, and as widely misunderstood, comment by John Stuart Mill. "There cannot . . . ," he wrote, "be intrinsically a more insignificant thing, in the economy of society, than money; except in the character of a contrivance for sparing time and labour. It is a machine for doing quickly and commodiously, what would be done, though less quickly and commodiously, without it: and like many other kinds of machinery, it only exerts a distinct and independent influence of its own when it gets out of order" [7, p. 488].

True, money is only a machine, but it is an extraordinarily efficient machine. Without it, we could not have begun to attain the astounding growth in output and level of living we have experienced in the past two centuries—any more than we could have done so without those other marvelous machines that dot our countryside and enable us, for the most part, simply to do more efficiently what could be done without them at much greater cost in labor.

But money has one feature that these other machines do not share. Because it is so pervasive, when it gets out of order, it throws a monkey wrench into the operation of all the other machines. The Great Contraction is the most dramatic example but not the only one. Every other major contraction in this country has been either produced by monetary disorder or greatly exacerbated by monetary disorder. Every major inflation has been produced by monetary expansion—mostly to meet the overriding demands of war which have forced the creation of money to supplement explicit taxation.

The first and most important lesson that history teaches about what monetary policy can do—and it is a lesson of the most profound importance—is that monetary policy can prevent money itself from being a major source of economic disturbance. This sounds like a negative proposition: avoid major mistakes. In part it is. The Great Contraction might not have occurred at all, and if it had, it would have been far less severe, if the monetary authority had avoided mistakes, or if the monetary arrangements had been those of an earlier time when there was no central authority with the power to make the kinds of mistakes that the Federal Reserve System made. The past few years, to come closer to home, would have been steadier and more productive of economic well-being if the Federal Reserve had avoided drastic and erratic changes of direction, first expanding the money supply at an unduly rapid pace, then, in early 1966, stepping on the brake too hard, then, at the end of 1966, reversing itself and resuming expansion until at least November, 1967, at a more rapid pace than can long be maintained without appreciable inflation.

Even if the proposition that monetary policy can prevent money it-

self from being a major source of economic disturbance were a wholly
negative proposition, it would be none the less important for that. As it
happens, however, it is not a wholly negative proposition. The mone-
tary machine has gotten out of order even when there has been no cen-
tral authority with anything like the power now possessed by the Fed.
In the United States, the 1907 episode and earlier banking panics are
examples of how the monetary machine can get out of order largely on
its own. There is therefore a positive and important task for the mone-
tary authority—to suggest improvements in the machine that will re-
duce the chances that it will get out of order, and to use its own powers
so as to keep the machine in good working order.

A second thing monetary policy can do is provide a stable back-
ground for the economy—keep the machine well oiled, to continue Mill's
analogy. Accomplishing the first task will contribute to this objective,
but there is more to it than that. Our economic system will work best
when producers and consumers, employers and employees, can proceed
with full confidence that the average level of prices will behave in a
known way in the future—preferably that it will be highly stable.
Under any conceivable institutional arrangements, and certainly under
those that now prevail in the United States, there is only a limited
amount of flexibility in prices and wages. We need to conserve this flexi-
bility to achieve changes in relative prices and wages that are required
to adjust to dynamic changes in tastes and technology. We should not
dissipate it simply to achieve changes in the absolute level of prices
that serve no economic function.

In an earlier era, the gold standard was relied on to provide confi-
dence in future monetary stability. In its heyday it served that function
reasonably well. It clearly no longer does, since there is scarce a coun-
try in the world that is prepared to let the gold standard reign un-
checked—and there are persuasive reasons why countries should not do
so. The monetary authority could operate as a surrogate for the gold
standard, if it pegged exchange rates and did so exclusively by altering
the quantity of money in response to balance of payment flows without
"sterilizing" surpluses or deficits and without resorting to open or con-
cealed exchange control or to changes in tariffs and quotas. But again,
though many central bankers talk this way, few are in fact willing to
follow this course—and again there are persuasive reasons why they
should not do so. Such a policy would submit each country to the va-
garies not of an impersonal and automatic gold standard but of the pol-
icies—deliberate or accidental—of other monetary authorities.

In today's world, if monetary policy is to provide a stable back-
ground for the economy it must do so by deliberately employing its
powers to that end. I shall come later to how it can do so.

Finally, monetary policy can contribute to offsetting major disturbances in the economic system arising from other sources. If there is an independent secular exhilaration—as the postwar expansion was described by the proponents of secular stagnation—monetary policy can in principle help to hold it in check by a slower rate of monetary growth than would otherwise be desirable. If, as now, an explosive federal budget threatens unprecedented deficits, monetary policy can hold any inflationary dangers in check by a slower rate of monetary growth than would otherwise be desirable. This will temporarily mean higher interest rates than would otherwise prevail—to enable the government to borrow the sums needed to finance the deficit—but by preventing the speeding up of inflation, it may well mean both lower prices and lower nominal interest rates for the long pull. If the end of a substantial war offers the country an opportunity to shift resources from wartime to peacetime production, monetary policy can ease the transition by a higher rate of monetary growth than would otherwise be desirable—though experience is not very encouraging that it can do so without going too far.

I have put this point last, and stated it in qualified terms—as referring to major disturbances—because I believe that the potentiality of monetary policy in offsetting other forces making for instability is far more limited than is commonly believed. We simply do not know enough to be able to recognize minor disturbances when they occur or to be able to predict either what their effects will be with any precision or what monetary policy is required to offset their effects. We do not know enough to be able to achieve stated objectives by delicate, or even fairly coarse, changes in the mix of monetary and fiscal policy. In this area particularly the best is likely to be the enemy of the good. Experience suggests that the path of wisdom is to use monetary policy explicitly to offset other disturbances only when they offer a "clear and present danger."

### III. *How Should Monetary Policy Be Conducted?*

How should monetary policy be conducted to make the contribution to our goals that it is capable of making? This is clearly not the occasion for presenting a detailed "Program for Monetary Stability"—to use the title of a book in which I tried to do so [3]. I shall restrict myself here to two major requirements for monetary policy that follow fairly directly from the preceding discussion.

The first requirement is that the monetary authority should guide itself by magnitudes that it can control, not by ones that it cannot control. If, as the authority has often done, it takes interest rates or the current unemployment percentage as the immediate criterion of policy,

it will be like a space vehicle that has taken a fix on the wrong star. No matter how sensitive and sophisticated its guiding apparatus, the space vehicle will go astray. And so will the monetary authority. Of the various alternative magnitudes that it can control, the most appealing guides for policy are exchange rates, the price level as defined by some index, and the quantity of a monetary total—currency plus adjusted demand deposits, or this total plus commercial bank time deposits, or a still broader total.

For the United States in particular, exchange rates are an undesirable guide. It might be worth requiring the bulk of the economy to adjust to the tiny percentage consisting of foreign trade if that would guarantee freedom from monetary irresponsibility—as it might under a real gold standard. But it is hardly worth doing so simply to adapt to the average of whatever policies monetary authorities in the rest of the world adopt. Far better to let the market, through floating exchange rates, adjust to world conditions the 5 per cent or so of our resources devoted to international trade while reserving monetary policy to promote the effective use of the 95 per cent.

Of the three guides listed, the price level is clearly the most important in its own right. Other things the same, it would be much the best of the alternatives—as so many distinguished economists have urged in the past. But other things are not the same. The link between the policy actions of the monetary authority and the price level, while unquestionably present, is more indirect than the link between the policy actions of the authority and any of the several monetary totals. Moreover, monetary action takes a longer time to affect the price level than to affect the monetary totals and both the time lag and the magnitude of effect vary with circumstances. As a result, we cannot predict at all accurately just what effect a particular monetary action will have on the price level and, equally important, just when it will have that effect. Attempting to control directly the price level is therefore likely to make monetary policy itself a source of economic disturbance because of false stops and starts. Perhaps, as our understanding of monetary phenomena advances, the situation will change. But at the present stage of our understanding, the long way around seems the surer way to our objective. Accordingly, I believe that a monetary total is the best currently available immediate guide or criterion for monetary policy—and I believe that it matters much less which particular total is chosen than that one be chosen.

A second requirement for monetary policy is that the monetary authority avoid sharp swings in policy. In the past, monetary authorities have on occasion moved in the wrong direction—as in the episode of the Great Contraction that I have stressed. More frequently, they have

moved in the right direction, albeit often too late, but have erred by moving too far. Too late and too much has been the general practice. For example, in early 1966, it was the right policy for the Federal Reserve to move in a less expansionary direction—though it should have done so at least a year earlier. But when it moved, it went too far, producing the sharpest change in the rate of monetary growth of the postwar era. Again, having gone too far, it was the right policy for the Fed to reverse course at the end of 1966. But again it went too far, not only restoring but exceeding the earlier excessive rate of monetary growth. And this episode is no exception. Time and again this has been the course followed—as in 1919 and 1920, in 1937 and 1938, in 1953 and 1954, in 1959 and 1960.

The reason for the propensity to overreact seems clear: the failure of monetary authorities to allow for the delay between their actions and the subsequent effects on the economy. They tend to determine their actions by today's conditions—but their actions will affect the economy only six or nine or twelve or fifteen months later. Hence they feel impelled to step on the brake, or the accelerator, as the case may be, too hard.

My own prescription is still that the monetary authority go all the way in avoiding such swings by adopting publicly the policy of achieving a steady rate of growth in a specified monetary total. The precise rate of growth, like the precise monetary total, is less important than the adoption of some stated and known rate. I myself have argued for a rate that would on the average achieve rough stability in the level of prices of final products, which I have estimated would call for something like a 3 to 5 per cent per year rate of growth in currency plus all commercial bank deposits or a slightly lower rate of growth in currency plus demand deposits only.[6] But it would be better to have a fixed rate that would on the average produce moderate inflation or moderate deflation, provided it was steady, than to suffer the wide and erratic perturbations we have experienced.

Short of the adoption of such a publicly stated policy of a steady rate of monetary growth, it would constitute a major improvement if the monetary authority followed the self-denying ordinance of avoiding wide swings. It is a matter of record that periods of relative stability in the rate of monetary growth have also been periods of relative stability in economic activity, both in the United States and other countries. Periods of wide swings in the rate of monetary growth have also been periods of wide swings in economic activity.

[6] In an as yet unpublished article on "The Optimum Quantity of Money," I conclude that a still lower rate of growth, something like 2 per cent for the broader definition, might be better yet in order to eliminate or reduce the difference between private and total costs of adding to real balances.

By setting itself a steady course and keeping to it, the monetary authority could make a major contribution to promoting economic stability. By making that course one of steady but moderate growth in the quantity of money, it would make a major contribution to avoidance of either inflation or deflation of prices. Other forces would still affect the economy, require change and adjustment, and disturb the even tenor of our ways. But steady monetary growth would provide a monetary climate favorable to the effective operation of those basic forces of enterprise, ingenuity, invention, hard work, and thrift that are the true springs of economic growth. That is the most that we can ask from monetary policy at our present stage of knowledge. But that much—and it is a great deal—is clearly within our reach.

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# ECONOMIES AS AN ANTITRUST DEFENSE:
## THE WELFARE TRADEOFFS

### *By* OLIVER E. WILLIAMSON*

Suppose that a merger (or other combination) is proposed that yields economies but at the same time increases market power. Can the courts and antitrust agencies safely rely, in these circumstances, on a literal reading of the law which prohibits mergers "where in any line of commerce or any section of the country, the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly,"[1] or does this run the risk of serious economic loss? In the usual merger where both effects are insubstantial this problem is absent.[2] But in the occasional case where efficiency and market power consequences exist, can economies be dismissed on the grounds that market power effects invariably dominate? If they cannot, then a rational treatment of the merger question requires that an effort be made to

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[1] Public Law 899, Sec. 7, 38 Stat. 731, as amended; 15 U.S.C. 18.

[2] Donald Dewey has observed in this connection that most mergers "have virtually nothing to do with either the creation of market power or the realization of scale economies" [9, p. 257]. Jesse Markham agrees that since 1930 monopolization has not been a principal merger objective, but finds that "some mergers have undoubtedly come about as adjustments to major innovations . . . : the first great wave of mergers followed a period of rapid railroad building, and the wave of the 1920s came with the rise of the motor car and motor truck transportation and a new advertising medium, the home radio" [22, pp. 181–82]. It might be useful briefly to summarize some of the ways in which efficiencies might result from combination. These would include miscalculation, shifts in demand, technological developments, displacement of ineffective managements, and mixtures thereof.

As an example of miscalculation consider two firms that have entered a market at an efficient plant scale but have incorrectly estimated the volume necessary to support an efficient distribution system. Combination here could lead to efficiencies but might also have some market power effects (reducing competition between the two but possibly enhancing their competitive position with respect to their rivals). A significant, persistent decline in demand might produce a condition of excess capacity in which combination would permit economies but would also have market power consequences. As discussed in Section III, an increase in demand might induce a change from job shop to assembly line type operations with vertical integration consequences. Technological developments may similarly provide opportunities for a significant reorganization of resources into more efficient configurations—the electronic digital computer being a recent example. Finally, merger may be the most expeditious way of displacing an inefficient by a more efficient management—but the benefits here may only be of a short-run variety. A manifestly inefficient management would, hopefully, be displaced by other means if, by reason of the market power consequences of a combination, the merger route were closed.

A merger can, of course, produce diseconomies as well. What I have previously characterized as the "control loss" phenomenon appears to be an increasing function of firm size [31]. See also Parts 7 and 8, Section II, infra.

establish the allocative implications of the scale economy and market power effects associated with the merger.

The initial indication of the Supreme Court's view on this question came on the occasion of the first merger case to come before it under the 1950 amendment to Section 7 of the Clayton Act. In a unanimous opinion, the Court took the position in *Brown Shoe* that not only were efficiencies no defense, but a showing that a merger resulted in efficiencies could be used affirmatively in attacking the merger since small rivals could be disadvantaged thereby [6, p. 374]. Opportunities to reconsider this position have presented themselves since, *Procter & Gamble* being the most recent.

Justice Douglas, in delivering the opinion of the Court, observed that Procter & Gamble "would be able to use its volume discounts to advantage in advertising Clorox," and went on to state that "economies cannot be used as a defense to illegality. Congress was aware that some mergers which lessen competition may also result in economies but it struck the balance in favor of protecting competition" [10, pp. 1230–31]. Although reference to congressional intent may relieve the Court of the responsibility for making tradeoff valuations, this does not fully dispose of the issue. What tradeoff calculus did Congress employ that produced this result?

In a concurring opinion to the Clorox decision, Justice Harlan provides the first hint that efficiencies may deserve greater standing. At least with respect to conglomerate or product-extension mergers "where the case against the merger rests on the probability [as contrasted, apparently, with a certainty] of increased market power, the merging companies may attempt to prove that there are countervailing economies reasonably probable which should be weighed against the adverse effects" [10, pp. 1240–41]. But inasmuch as the economies in Clorox were in his opinion merely pecuniary rather than real, which distinction is of course appropriate, he concluded that Procter's efficiency defense was defective [10, p. 1243].

Even if Justice Harlan's position were the prevailing one, it is clear that economies would be an acceptable antitrust defense for only a restricted set of structural conditions. Since the relevant economic theory, although widely available, has never been developed explicitly on this issue, such a result is not unexpected. Indeed, lacking a basis for evaluating net effects, for the Court to hold that the anticompetitive consequences of a merger outweigh any immediate efficiency advantages is only to be expected. An institution acting as a caretaker for the enterprise system does not easily exchange what it regards as long-term competitive consequences for short-term efficiency gains.

The merits of the Supreme Court's position on mergers are at the

heart of the recent Bork and Bowman v. Blake and Jones debate [2, 3, 4, 5]. Although this dialogue deals directly with the critical issues, its failure to produce a consensus is at least partly due to the fact that essential aspects of the relevant economic model were not supplied. Lacking a tradeoff relation, Bork is forced to assert that "Economic analysis does away with the need to measure efficiencies directly. It is enough to know in what sorts of transactions efficiencies are likely to be present and in what sorts anticompetitive effects are likely to be present. The law can then develop objective criteria, such as market shares, to divide transactions [into those predominantly one type or other]" [5, p. 411]. But this obviously leaves the mixed cases, which are the hard ones, unresolved. Blake and Jones, by contrast, conclude that "claims of economic efficiency will not justify a course of conduct conferring excessive market power. The objective of maintaining a system of self-policing markets requires that all such claims be rejected" [3, p. 427]. But what are the standards for "excessive" market power and "self-policing" markets? And are these really absolute or do they reflect an implicit tradeoff calculation? And if it is the latter, should we (if we can) make this tradeoff explicit?

Indeed, there is no way in which the tradeoff issue can be avoided. To disallow tradeoffs altogether merely reflects a particularly severe a priori judgment as to net benefits. Moreover, it is doubtful that a goal hierarchy scheme of the sort proposed by Carl Kaysen and Donald Turner has acceptable properties. As they formulate the problem, higher level goals strictly dominate lower level goals, so that only when the latter are available without sacrifice in the former is lower level goal pursuit allowed [16, pp. 44–45]. Inasmuch as they rank efficiency and progressiveness above reductions in market power, an absolute defense would appear to obtain when, for any structural condition present or prospective, it could be shown either that economies have not yet been exhausted or that discreteness conditions (indivisibilities) would not efficiently permit a separation [16, pp. 44–46, 58, 78]. But this may be to construe their intentions too narrowly; for it is with antitrust actions that result in *substantial* efficiency losses [16, pp. 44, 133] and involve *too great* a sacrifice in performance [16, p. 58] that they are especially concerned. Although these distinctions are important, they are not ones for which goal hierarchy analysis is well suited to deal. Tradeoff analysis, by contrast, is designed to cope with precisely these types of issues.

The relevant partial equilibrium model with which to characterize the tradeoffs between efficiency and price effects together with a representative set of indifference relations are developed in Section I of this paper. A variety of essential qualifications to this naive model are then

P

$P_2$

$A_1$: Dead-Weight Loss

$AC_1$

$P_1$

$AC_2$

$A_2$: Cost Saving

D

0    $Q_2$    $Q_1$    Q
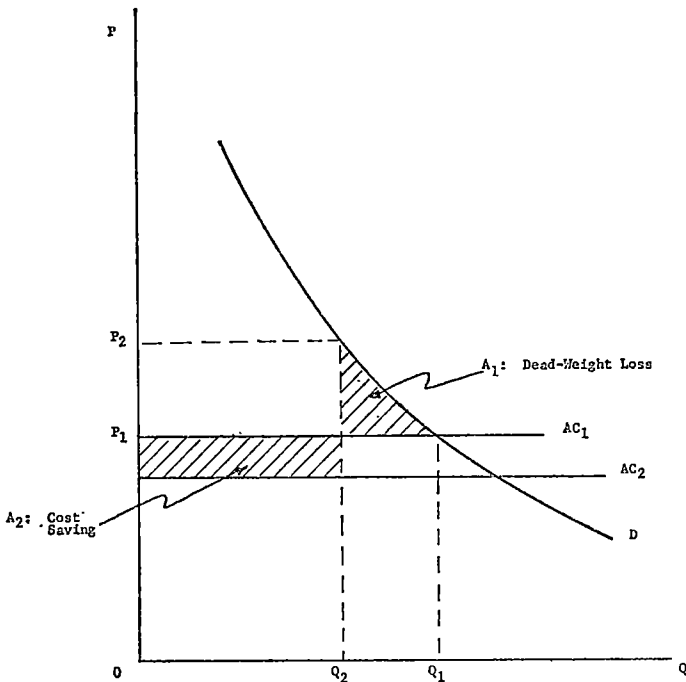
FIGURE 1.

presented in Section II. Extensions of the argument, which is developed initially in horizontal merger terms, to deal with questions of dissolution as well as vertical and conglomerate mergers, are given in Section III. The conclusions follow in Section IV.

## I. *The Naive Tradeoff Model*

The effects on resource allocation of a merger that yields economies but extends market power can be investigated in a partial equilibrium context with the help of Figure 1. The horizontal line labeled $AC_1$ represents the level of average costs of the two (or more) firms before combination, while $AC_2$ shows the level of average costs after the merger. The price before the merger is given by $P_1$ and is equal to $k$ $(AC_1)$, where $k$ is an index of pre-merger market power and is greater than or equal to unity. The price after the merger is given by $P_2$ and is assumed to exceed $P_1$ (if it were less than $P_1$ the economic effects of the merger would be strictly positive).[3]

[3] This is a simple but basic point. It reveals that market power is only a necessary and not a sufficient condition for undesirable price effects to exist. It would be wholly irrational to regard an increase in the price to average cost ratio $(P_2/AC_2 > P_1/AC_1)$ as grounds for opposing a merger if, at the same time, the post-merger price were less than the pre-merger level $(P_2 < P_1)$.

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The net welfare effects of the merger are given (approximately) by the two shaded areas in the Figure. The area designated $A_1$ is the familiar dead-weight loss that would result if price were increased from $P_1$ to $P_2$, assuming that costs remain constant. But since average costs are actually reduced by the merger, the area designated $A_2$, which represents cost savings, must also be taken into account. The net allocative effect is given by the difference, $A_2 - A_1$, of these two areas.[4]

The area $A_2$ is given by $(AC_2 - AC_1)Q_2$, or $[\Delta(AC)]Q_2$, while $A_1$ is given approximately by $\frac{1}{2}(P_2 - P_1)(Q_1 - Q_2)$, or $\frac{1}{2}(\Delta P)(\Delta Q)$. The net economic effect will be positive if the following inequality holds:

$$(1) \qquad [\Delta(AC)]Q_2 - 1/2(\Delta P)(\Delta Q) > 0.$$

Dividing through by $Q_2$ and substituting for $\Delta Q/Q$ the expression $\eta(\Delta P/P)$, where $\eta$ is the elasticity of demand, we obtain:

$$(2) \qquad \Delta(AC) - 1/2(\Delta P)\eta\frac{\Delta P}{P} > 0.$$

Finally, dividing through by $P_1 = k(AC_1)$ we have as our criterion:

$$(3) \qquad \frac{\Delta(AC)}{AC} - \frac{k}{2}\eta\left(\frac{\Delta P}{P}\right)^2 > 0.$$

If this inequality holds, the net allocative effect of the merger is positive. If the difference is equal to zero the merger is neutral. If the inequality is reversed the merger is negative.

In words, the inequality shown in (3) says that if the decimal fraction reduction in average costs exceeds the square of the decimal fraction increase in price multiplied by one-half $k$ times the elasticity of demand, the allocative effect of the merger is positive. Setting $k$ equal to one (which it will be if the pre-merger market power is negligible), the cost reductions necessary to offset price increases for various values of the elasticity of demand are shown in Table 1.

For example, if price were to increase by 20 per cent, then running across the row $[(\Delta P/P) \times 100] = 20$ we observe that if $\eta$ is 2 a cost reduction of 4 per cent will be sufficient to offset the price increase, while if $\eta$ is 1 only a 2 per cent cost decrease is needed to neutralize the price effect, and if $\eta$ is $\frac{1}{2}$, a cost reduction of 1 per cent is sufficient. More generally it is evident that a relatively modest cost reduction is usually

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[4] My use of dead-weight loss is somewhat restrictive. Inefficiency is also a dead-weight loss. For convenience of exposition, however, I refer to the Marshallian triangle as the dead-weight loss and compare this to the cost saving (efficiency) aspects of a merger. Estimating the value of consumers' surplus by the Marshallian triangle follows the common (and broadly defensible) practice of suppressing the income effects associated with a price change. The net social benefit associated with a particular cost-price configuration is defined as total revenue plus consumers' surplus less social cost, where social and private costs are assumed to be identical (externalities and producers' surplus are both assumed to be zero).

TABLE 1—PERCENTAGE COST REDUCTIONS [(Δ(AC)/AC)×100] SUFFICIENT TO OFFSET
PERCENTAGE PRICE INCREASES (ΔP/P×100) FOR SELECTED VALUES OF $\eta$

| [(ΔP/P)×100]    $\eta$ | 2 | 1 | 1/2 |
|---|---|---|---|
| 5 | .25 | .12 | .06 |
| 10 | 1.00 | .50 | .25 |
| 20 | 4.00 | 2.00 | 1.00 |
| 30 | 9.00 | 4.50 | 2.25 |

sufficient to offset relatively large price increases even if the elasticity of demand is as high as 2, which is probably a reasonable upper bound. Indeed, if a reduction in average costs on the order of 5 to 10 per cent is available through merger, the merger must give rise to price increases in excess of 20 per cent if $\eta\cong2$, and in excess of 40 per cent if $\eta\cong\frac{1}{2}$, for the net allocative effects to be negative. Moreover, it should be noted, if the merger reduces average costs by $x$ per cent and the post-merger price increases by $y$ per cent, the post-merger price to average cost differential slightly exceeds $x+y$ per cent. Thus, expressing price with respect to the post-merger level of average costs yields an even greater differential than is reflected by the relations stated above. The naive model thus supports the following proposition: a merger which yields non-trivial real economies must produce substantial market power and result in relatively large price increases for the net allocative effects to be negative.

## II. Qualifications

Our partial equilibrium analysis suffers from a defect common to all partial equilibrium constructions. By isolating one sector from the rest of the economy it fails to examine interactions between sectors. Certain economic effects may therefore go undetected, and occasionally behavior which appears to yield net economic benefits in a partial equilibrium analysis will result in net losses when investigated in a general equilibrium context. Such a condition has been shown to exist in an economy in which monopoly exists in many sectors. Thus, whereas partial equilibrium analysis indicates that an increase in the monopoly price in any one sector invariably yields a loss, viewed more generally such an isolated price increase may actually lead to a desirable reallocation of resources.[5] Conceivably, therefore, a merger that has monopoly power and cost-saving consequences could yield benefits in *both* respects —although it is probably rare that operational content can be supplied

[5] This is the familiar "second-best" argument. For a discussion of second-best qualifications in treating the monopoly problem, and references to this literature, see Ferguson [11, pp. 16–17, 49–51].

to this qualification. But were there no other considerations, such bias as our partial equilibrium construction produces would be to underestimate the net economic gains of combination.

This does not, however, exhaust the range of qualifications. Among the other factors that can or should be taken into account are inference and enforcement expense, timing, incipiency, weighting, income distribution, extra-economic political objectives, technological progress, and the effects of monopoly power on managerial discretion.

## A. *Inference and Enforcement Expense*

The relevant effects are those which take the form of real rather than pecuniary economies. Also, since evaluating a claim that economies exist will itself absorb real resources, it seems reasonable to impose a requirement that the net gain exceed some threshold value before such a defense will even be entertained. This, in conjunction with qualifications B through D below, would appear to meet Donald Turner's point that if economies are to be invoked as a defense "the law might well require clear and convincing evidence that the particular merger would produce substantial economies that could not be achieved in other ways" [27, p. 1328]. As the tools for assessing economies are progressively refined (and the incentive to make such improvements is obvious once an efficiency defense—even in principle—is granted), this threshold level should be reduced accordingly.

Operationally it may be essential to express the value of the threshold as a function of the ease with which economies can be established. Economies that have a highly speculative aspect should be required to reach a higher minimum level than those which are more objectively specified. (Thus if economies in both production and distribution expenses are claimed, and if the former are better specified than the latter, distribution economies would have to reach a higher threshold than would production economies to be admissible.) Since the ease with which exaggerated claims are detected varies directly with the degree of distortion attempted, and since evidence of distortion seriously debilitates a defense, adjusting the threshold in this way will tend to protect the enforcement agencies against grievously inflated efficiency claims.

Bork, apparently, would resist the argument that the defendants should bear the burden of proof on efficiencies since many efficiencies may be difficult to establish [5, p. 410]. But if efficiencies are to be a defense at all, it is clear that the companies—which are, presumably, sensitive to the relevant economies in proposing the merger in the first place—must be prepared to make the case for them in court. They have the data and these must be supplied. Otherwise the mixed case which involves both scale economy and market power effects can only be handled arbitrarily—and this is satisfactory to no one.

## B. *Timing*

Significant economies will ordinarily be realized eventually through internal expansion if not by merger. Growth of demand can facilitate this internal adjustment process; the necessity for part of the industry to be displaced in order that efficient size be achieved is relieved in a growing market. Thus, although a merger may have net positive effects immediately (cost savings exceed the dead-weight loss), when allowance is made for the possibility of internal expansion these effects can become negative eventually (the cost savings persist, but these could be realized anyway, and the dead-weight loss could be avoided by prohibiting the merger).

Designating the dead-weight loss effects of the merger by $L(t)$ and the cost savings by $S(t)$, the argument would be that the value of $S(t)$ falls while $L(t)$ persists over time. Thus, taking the discounted value of net benefits $(V)$ we have:

$$(4) \qquad V = \int_0^T [S(t) - L(t)]e^{-rt}dt,$$

and if initially $S(t)/L(t) > 1$, but eventually $S(t)/L(t) < 1$, this can easily become negative. Consider, for example, the case where $S(t) = \overline{S}$ for a period of length $T'$ and then becomes zero, while $L(t) = \overline{L}$ indefinitely. Using a social discount rate of 10 per cent, what initial combinations of $\overline{S}/\overline{L}$ and $T'$ would leave us just indifferent over the allocative effects of a merger? For $\overline{S}/\overline{L}$ of 3, indifference occurs at a value of $T'$ of 4 years; any value of $T'$ less than 4 years would reveal that the scale economies can be realized by internal expansion in a sufficiently short interval that the merger should be disallowed, while any value of $T'$ that exceeds 4 years would show that net gains are available by approving the merger. For $\overline{S}/\overline{L}$ of 2, the corresponding value of $T'$ is 7 years, while for $\overline{S}/\overline{L}$ of 1.5, the value of $T'$ increases to 11 years. The necessary qualifications to our earlier results are thus obvious: only if $\overline{S}/\overline{L}$ is relatively large, or $T'$ reasonably long, should a merger which results in eventual net losses be approved.

By contrast with a growing market, to force economies to be realized by internal expansion in a static market is generally without merit. The market power effects will occur here anyway, and the internal expansion route merely delays and may upset the market adjustment.

The above results are merely illustrative. More generally, equation (4) calls attention to the importance of considering the shape of the time stream of benefits and costs that a merger produces. Thus it is not sufficient to justify a merger on the basis of merely potential economies. Not only is it relevant to consider whether the merger would produce net benefits, but whether the timing is such as to maximize these gains. If a

merger is proposed that promises potential economies, but these will not be realized for some time, it may be better to delay the combination. Such might be the case in circumstances where the existing plant has not exhausted its useful life and has limited value in other uses; in this situation investment in the new facilities may not be economical immediately. For the merger to occur much earlier than the indicated economies will be realized would permit whatever market power effects as the merger produces to take effect at an earlier time than is clearly most beneficial.

Plausible as this last argument may appear, it raises a serious question of how extensive a "management" function the enforcement agencies should play in merger matters. It is an easy step from the suggestion that a proposed merger should be delayed until maximum net gains are realized to the proposition that the enforcement agencies should "arrange" optimal firm pairings. Both of these, however, are much more ambitious tasks than merely testing whether the net gain associated with a proposed combination is positive. Subject possibly to occasional exceptions where the social net benefit calculus identifies a distinctly superior timing or combination from that which has been proposed privately (and assuming that the change can be implemented), the simple requirement that discounted net gains be positive is probably a sufficient test. Otherwise, mergers are too complex to postpone casually; and the enforcement agencies are not designed (nor should they be redesigned) to function in a brokerage capacity.

C. *Incipiency*

It is likewise vital to consider not merely the market power effects of any single merger taken in isolation, but whether the merger is representative of a trend. If a series of such mergers can reasonably be expected, the judgment of whether to permit any given combination should properly be cast in an industry context—in which case the anticipated economy and market power effects throughout the industry should be examined. Since, if economies are available by combining one pair of firms they will often be available more generally, this may frequently be an important consideration. The notion of incipiency thus has special relevance in administering the law on mergers where economies are claimed.

This proposition might usefully be contrasted with that of Bork and Bowman [2, p. 594]:

> The difficulty with stopping a trend toward a more concentrated condition at a very early stage is that the existence of the trend is prima facie evidence that greater concentration is socially desirable. The trend indicates that there are emerging efficiencies or economies of scale—whether due to engineering and production developments or to

new control and management techniques—which make larger size
more efficient. This increased efficiency is valuable to the society at
large, for it means that fewer of our available resources are being used
to accomplish the same amount of production and distribution. By
striking at such trends in their very earliest stages the concept of
incipiency prevents the realization of those very efficiencies that com-
petition is supposed to encourage.

Their evaluation of the social desirability of a trend suggests a certain
insensitivity to the relevant scale economy-market power tradeoff con-
siderations, and they appear to read the significance of a trend some-
what too loosely. That a trend necessarily implies emerging efficiencies
is incorrect: it may also indicate an emerging awareness that market
power advantages might be realized through a series of combinations.[6]
Moreover, whereas they seem to suggest that to disallow a merger is to
prevent the realization of scale economies altogether, ordinarily it is not
a question of whether economies will be realized but when and with
what market power effects. Thus, while Bork and Bowman may be
correct in charging that scale economy justifications have not been
given sufficient weight in the recent enforcement of the merger law, they
are also guilty of a certain heavy-handedness in their own treatment of
the incipiency question.

## D. *Weighting*

The economies that a merger produces are usually limited strictly to
the combining firms. But the market power effects of a merger may
sometimes result in a price increase across a wider class of firms. Where
this occurs, a weighting factor should be introduced into expression (3)
to reflect this condition. The criterion becomes:

$$(3') \qquad \left(\frac{Q_2}{Q_T}\right)\frac{\Delta(AC)}{AC} - \frac{k}{2}\,\eta\left(\frac{\Delta P}{P}\right)^2 > 0,$$

where $Q_2$ is the output of the merging firms and $Q_T$ is the total quantity
of industry sales for which the price increase becomes effective.

## E. *Income Distribution*

An additional qualification to our analysis involves income distribu-
tion effects. The rectangle in Figure 1 bounded by $P_2$ and $P_1$ at the top
and bottom respectively and $O$ and $Q_2$ on the sides represents a loss of
consumers' surplus (gain in monopoly profits) that the merger produces.
On the resource allocation criteria for judging welfare effects advanced
above, the distribution of these profits becomes a matter of indifference.

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[6] This is George Stigler's point in his treatment of "Monopoly and Oligopoly by Merger"
[24]. Bork concedes this possibility in his response to Blake and Jones [5, p. 412]; but his prin-
cipal emphasis, which is probably correct, is that a trend signals emerging economies.

For specific welfare valuations, however, we might not always wish to regard consumer and producer interests symmetrically—although since, arguably, antitrust is an activity better suited to promote allocative efficiency than income distribution objectives (the latter falling more clearly within the province of taxation, expenditure, and transfer payment activities), such income distribution adjustments might routinely be suppressed. If they are not, the tradeoff between efficiency gains and distributive losses needs explicitly to be expressed. Thus, while economies would remain a defense, any undesirable income distribution effects associated with market power would be counted against the merger rather than enter neutrally as the naive model implies.

Inasmuch as the income redistribution which occurs is usually large relative to the size of the dead-weight loss, attaching even a slight weight to income distribution effects can sometimes influence the overall valuation significantly. Thus, expressing the dead-weight loss $(L=\frac{1}{2} (\Delta P) (\Delta Q))$ as a ratio of the income distribution effect $(I=(\Delta P)Q)$, and substituting into this ratio the expression for the elasticity of demand $(\eta)$, the fraction $L/I=\frac{1}{2} (\Delta P/P) \eta$ obtains. It is therefore obvious that, except where the elasticity of demand is "high," the dead-weight loss as a fraction of the income distribution effect is relatively small—certainly less than unity. Hence if, as is probably common, the income redistribution which results when market power is increased is regarded unfavorably, an appropriate weighting of this factor will, at least occasionally, upset a net valuation which on resource allocation grounds is positive.

Note in this connection that the transfer involved could be regarded unfavorably not merely because it redistributes income in an undesirable way (increases the degree of inequality in the size distribution of income), but also because it produces social discontent. This latter has serious efficiency implications that the above analysis does not take explicitly into account. This same point also appears to have gone unnoticed in the entire Bork and Bowman v. Blake and Jones exchange [2] [3] [4] [5]. Distinguishing social from private costs in this respect may, however, be the most fundamental reason for treating claims of private efficiency gains skeptically.

### F. *Political Considerations*

Combinations which involve firms that are already very large in absolute terms might be resisted on grounds that these raise extra-economic problems of political significance. There is not, however, any obvious way in which to integrate these into the analysis. Rather, although the political implications of control over wealth are a matter for serious concern, these are separable from the economic problems posed by control over markets; a different calculus is required to deal

with each. The necessary political judgment, ideally, is one for Congress to make. Possibly, as Carl Kaysen has suggested, this would take the form of a prohibition against expansion by merger of the largest 50 or 100 corporations [17, p. 37].

The issue here reaches beyond the social discontent matter raised above. Thus, whereas social discontent can be reduced, in principle at least, to efficiency-equivalent (net value product) terms, the political implications of the control over wealth involve a judgment of how the quality of life in a democracy is affected by size disparities. The latter is less easily (or even appropriately) expressed in efficiency terms. The issue is nevertheless important, and failure to deal with it may be unresponsive to the position taken by Blake and Jones. Inasmuch as several of the counterexamples that they pose in their critique of Bork and Bowman appear deliberately to have been selected from the giant firm universe [5, pp. 425–27], possibly it is mergers within this subset that concern them most. Should economies be allowed as a defense, therefore, the rule proposed by Kaysen would limit such a defense in a way which would presumably relieve this aspect of their concern.

## G. *Technological Progress; and*
## H. *Managerial Discretion*

The highly conjectural nature of qualifications G and H makes it unclear at this time what weight ought to be assigned to them. It is at least arguable that the prevailing uncertainties are too great to give any effect to these two factors at this time. They are, nevertheless, potentially of such significance that to dismiss them may run the risk of serious error. In consideration of this potential importance, additional research which would permit us better to evaluate their actual significance would seem warranted. The manner in which each would influence the estimate of net effects is sketched out below.

Consider technological progress first. Such increases in market power that result in predictable effects on technological progress should, if they can easily, be taken into account. The present evidence, while hardly abundant, suggests that, as a general rule, the research and development expenditures of the four largest firms in an industry are neither as large proportionately nor as productive as those of their immediately smaller rivals.[7] But this fails to answer the question of what

[7] With respect to size, Mansfield found that the ratio of innovations to firm size reached a maximum at about the sixth largest firm for the petroleum and coal industries, and at a much lower rank for steel [20, p. 566]. Elsewhere Mansfield reports that the largest firms in petroleum, drugs, and glass spent somewhat less on R&D, relative to sales, than did somewhat smaller firms; in chemicals they spent somewhat more; in steel they spent less, but the difference was not statistically significant [21, p. 334]. Scherer concludes from his study of patent behavior in a group of 448 firms selected from the Fortune list of the largest 500 industrial corporations in 1955 that "the evidence does not support the hypothesis that corporate bigness is especially favorable to high inventive output" [23, p. 1114]. Turning to productivity, Mansfield con-

market structures most enhance progressiveness. The evidence on this latter is somewhat mixed.[8] It seems unlikely, however, that subsequent investigation will upset the basic proposition that progressiveness is promoted by at least some elements of competition at virtually every stage of an industry's development—if for no other reason than that competition tends to assure that variety in research approaches will be employed. Local or regional monopolies may provide partial exceptions (since here the requisite variety will be available nationally, although the rate at which innovations are implemented may nevertheless lag if competitive pressures are lacking), but monopoly, or near-monopoly, would not seem to be the perfect instrument for technical progress in industries for which the relevant market is national.

Lacking additional evidence, it would not seem injudicious to assume that mergers between relatively small-sized firms rarely have negative (and may frequently have positive) effects on progressiveness, whatever the condition of concentration. This judgment probably holds for most mergers involving lower-middle sized firms as well. Thus it is mainly in the relatively large firms, particularly those in moderately to highly concentrated national markets (which, of course, are also ones where market power effects may be important), that the effects of a merger on technological progress deserve special attention.

Whether the effects be positive or negative, the necessary extension to the model is identical. Assume therefore that a merger is proposed involving a large firm in a concentrated industry, and that while it yields economies it also predictably decreases the rate of progressiveness. Holding constant for the moment the effects on price, how large a change in the rate of technical progress would be required to offset the available economy of scale advantage? To obtain a crude estimate of this, let $\theta$ be the ratio of the immediate post-merger to pre-merger average costs (so that $1-\theta$ is the immediate decimal fraction reduction in average costs), $g_1$ be the rate of productivity increase in the absence of the merger and $g_2$ the rate if the merger is approved (where $g_1 \geq g_2$), $Q(t)$ be the output in period $t$, and let $r$ be the social discount rate. Then the merger will have neutral effects if the discounted value of costs under

cludes that "in most industries, the productivity of an R&D program of given scale seems to be lower in the largest firms than in somewhat smaller firms" [21, p. 338]. Comanor found that diseconomies of scale in the pharmaceutical industry were encountered at even moderate firm sizes [8, p. 190]. For a recent review of this literature, see Johnson [15, pp. 169–71].

[8] Hamburg [13, Ch. 4] and Horowitz [14, pp. 330–01] report a positive correlation between R&D expenditures and industrial concentration. Scherer finds a much weaker but slightly positive association [23, pp. 1119–21]. Kendrick concludes from an examination of 'Terleckyj' data that there is no significant correlation between productivity changes and industrial concentration [18, p. 179]. Stigler found in an earlier study "hints that industries with lower concentration had higher rates of technological progress" [26, p. 278], while I, using Mansfield's data, found a negative correlation between the proportion of innovations introduced by the four largest firms and industrial concentration [30].

each condition is the same. This requires that the equality given below should hold:

(5)  $$\int_0^\infty [(AC)Q(t)e^{-g_1 t}]e^{-rt}dt = \int_0^\infty [\theta(AC)Q(t)e^{-g_2 t}]e^{-rt}dt$$

Assuming that output increases exponentially at the rate $\alpha$, the critical value of $g_2$ is given by:

(6)  $$g_2 = \theta g_1 - (1 - \theta)(r - \alpha)$$

If, for example, the values of $\theta$, $g_1$, and $r-\alpha$ were .90, .03, and .07 respectively, the critical value of $g_2$ would be .02. Were $g_2$ to fall below this value, an indicated economy of 10 per cent would not be sufficient to offset the cumulative productivity loss associated with the merger, to say nothing of the market power effects that the merger produces. If indeed the selected values of $g_1$ and $r-\alpha$ are at all representative, a predictable decrease in the rate of productivity advance by one-third or more would thus be sufficient to disallow a merger for which an efficiency advantage as large as 10 per cent could be expected.[9]

Consider now the managerial discretion argument. Here the direction of the effect is not so much a matter for dispute as is its quantitative significance. The argument is that market power provides a firm with the opportunity to pursue a variety of other-than-profit objectives. Although this is an "old" argument, its persistence at least suggests the possibility that it may not be without merit.[10] Whether qualitatively there is anything to it turns essentially on the behavioral proposition that where competition in the product market presents no significant threat to survival, the resources of the firm are absorbed in part as corporate consumption activities by those members of the firm who are knowledgeable of discretionary opportunities, powerfully situated, and disposed to be assertive [29, 32]. Its quantitative significance rests on a judgment over whether the conspicuous evidence is sufficiently strong.[11]

If indeed a predictable relaxation in the least-cost posture of a firm which has acquired market power through merger can be made, the

[9] If the beneficial economies of scale are available only to the combining firms, while the negative progressiveness effects are felt throughout the industry, the above results underestimate the extent of economies necessary to produce indifference.

[10] As Arthur Hadley observed in 1897, "The tendency of monopoly to retard the introduction of industrial improvement is . . . a more serious thing than its tendency to allow unfair rates. This aspect of the matter has hardly received proper attention. We have been so accustomed to think of competition as a regulator of prices that we have lost sight of its equally important function as a stimulus to efficiency. Wherever competition is absent, there is a disposition to rest content with old methods, not to say slack ones. In spite of notable exceptions this is clearly the rule" [12, p. 383].

[11] This presently is the weakest part of the argument. For a recent survey of the data, see [19].

estimated cost savings that appear in equation (4) should be adjusted accordingly. Economies which are available in theory but, by reason of market power, are not sustainable are inadmissible.

### III. *Extensions*

Although the foregoing analysis has been concerned exclusively with horizontal mergers, the argument applies generally to problems in which market power-efficiency tradeoffs exist. Dissolution, vertical mergers, and conglomerate mergers can all be treated within this general framework.

### A. *Dissolution*

The argument here is perfectly straightforward. It is simply not sufficient in a monopolization case for which dissolution is the indicated relief that (1) a persistent monopoly condition $(P_1 > AC_1)$ exist, and (2) a reduction in price following dissolution $(P_2 < P_1)$ be expected. It is necessary in addition that the gains realized by the price reduction be sufficient to offset any losses in economies that result. The relevant test is that shown in equation (3)—modified, as may be necessary, by the qualifications discussed in Section II above.

### B. *Vertical Mergers*

It is important to note in dealing with vertical mergers that the conventional analysis of vertical integration, which takes a historical definition of an industry as given, often leads to incorrect results. The logical boundaries of a firm are not necessarily those which have been inherited but rather are defined by the condition that the firm be unable to arrange a transaction internally more cheaply than the market.[12] This is not something which is given once-for-all but depends both on technology and the extent of the market. Thus what may be regarded as "vertical integration" under a historical definition of an industry might, in many instances, more accurately be characterized as a reorganization into a more efficient configuration. For example, as technology evolves processes that are more fully automated or as demand for a commodity increases sufficiently to warrant continuous processing techniques, combinatorial economies may result by serially linking activities within a single firm that had previously been done in separate specialty firms.[13] A transformation of this sort accomplished in part

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[12] As Ronald Coase has pointed out, "a firm will tend to expand until the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market or the costs of organizing in another firm" [7, p. 341].

[13] Stigler argues that increasing the extent of the market will often lead to dis-integration of manufacturing processes since now the market will be sufficient to support a specialized firm [25, pp. 188–90]. Although this may often occur, there is also the countervailing tendency

through vertical mergers is probably common in the production of commodities which shift from sequential job shop to continuous assembly line type operations.

That vertical integration can produce real economies is a result of the fact that the market does not perform its exchanges costlessly. Going to the market involves search costs, contracting costs, misinformation costs, delay costs, transfer costs, interface costs, etc.,[14] and these must be balanced against the costs of organizing a transaction internally. Where the former exceed the latter, "vertical integration" is indicated. But of course this is vertical integration in only an apparent sense: in fact it represents a rationalization of the firm into an optimum economic unit.

The historical organization of an industry can ordinarily be presumed to reflect adequately basic efficiencies where significant market or technological developments have been lacking. And even where such recent changes have occurred, an efficiency defense is not automatic. Furthermore, if an efficiency defense can be supplied, any market power consequences that a vertical merger produces need also to be considered.[15] Again the basic tradeoff calculation is that given by equation (3)— modified as necessary by the qualifications discussed in Section II.

## C. *Conglomerate Mergers*

The principal ways in which conglomerate mergers can produce efficiencies have been given previously by M. A. Adelman [1, pp. 241–42] and Turner [27, pp. 1323–39, 1358–61]. The ways in which conglomerate mergers may produce market power are also discussed by Turner. All that remains, essentially, is to deal with the tradeoff question. Again the rules for estimating net benefits are substantially those given above.

## IV. *Conclusions*

Most mergers produce neither significant price nor efficiency consequences, and where this is true the analysis of this paper has limited relevance. Where both occur, however, and if without merger the transition to an efficient industrial configuration is apt to be both painful and delayed, an efficiency defense deserves consideration. This does not of

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to maintain or extend integration where coordination among the parts in the face of market uncertainties is critical—as it often is where assembly line operations are employed. See Coase [7, p. 337].

[14] Coase discusses some of these [7, pp. 336–37]. (For an early example in which the costs going to the market were examined in a common law proceeding, see *Hadley* v. *Baxendale*.) In addition, if suppliers possess market power, going to the market may involve pecuniary expenses that could be avoided by integrating backward into supply activities.

[15] Stigler identifies barriers to entry that take the form of increased capital and/or knowledge requirements as potential anticompetitive consequences of a vertical merger [25, p. 191].

course mean that the mere existence of economies is sufficient to justify a merger. But since a relatively large percentage increase in price is usually required to offset the benefits that result from a 5 to 10 per cent reduction in average costs, the existence of economies of this magnitude is sufficiently important to give the antitrust authorities pause before disallowing such a merger. There are, as indicated in Section II, a variety of qualifications that may upset this general conclusion in any particular case, but absent these and the result clearly holds.

It might be objected that the courts do not possess the expertise to make the types of judgments described. This is typically true. But that does not mean that an analysis of these effects should be not performed by the Antitrust Division or Federal Trade Commission before deciding to challenge a merger. The enforcement agencies can obtain, at reasonable cost, the necessary expertise to make these evaluations.[16] Only after they are convinced that such economies as may exist are not sufficient to justify a merger should a case go forward. Although possibly this extends the responsibility of the enforcement agencies beyond those that are clearly intended, the alternative is scarcely acceptable. For if neither the courts nor the enforcement agencies are sensitive to these considerations, the system fails to meet a basic test of economic rationality. And without this the whole enforcement system lacks for defensible standards and becomes suspect.

Once economies are admitted as a defense, the tools for assessing these effects can be expected progressively to be refined. Since such refinements will permit both the courts and the enforcement agencies to make more precise evaluations, the threshold value under which an economies defense will be allowed can be reduced accordingly. Thus even if initially only a few mergers for which mixed effects are present are able to pass an appropriately qualified tradeoff test because of high threshold requirements, this proportion can be expected to increase as research results and analytical aids for evaluating scale economies accumulate. As an interim gain, solemn references to early oratory might finally be displaced in favor of analysis in the continuing dialogue on antitrust enforcement.

[16] That the enforcement agencies are sensitive to scale economy considerations is evidenced by the recent Federal Trade Commission merger guidelines "Enforcement Policy with Respect to Mergers in the Food Distribution Industries," issued January 3, 1967. See especially pages 6–9.

Justice Brennan observed in the Philadelphia National Bank merger that "a merger the effect of which 'may be substantially to lessen competition' is not saved because, on some ultimate reckoning of social or economic debits and credits, it may be deemed beneficial. . . . [Such] is beyond the ordinary limits of judicial competence" [28, p. 371]. My point is that, at least with respect to efficiencies, such reckoning need not and indeed should not be beyond the competence of the antitrust agencies. It is here that the first critical decision of whether to file suit is made.

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# A PEASANT'S VIEW OF A SOVIET COLLECTIVE FARM

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If we were peasants on a Soviet collective farm (kolkhoz) operated like the one in Domar's model [2], we could be easily persuaded to revolt against an enlightened management who read the *American Economic Review*. In this paper we modify previous models of co-operative enterprises[1] to reflect the influences of private plots and quota constraints. The objective in our kolkhoz model is to maximize the total per capita income of members. Throughout, our perspective is that of a peasant co-op member who is guided by the revisionist trait of self-interest. The paradoxical features of a pure model of a co-op due to Ward [12] are slightly altered.

The private plots which generate part of a peasant's income are explicitly incorporated into our model in Part I. Collective responses to changes in product prices and rents can be separated into substitution and scale effects in a manner analogous to the Slutsky equations. The way in which centrally planned quotas constrain the outputs and income of a kolkhoz is examined in Part II. In Part III, we briefly discuss how the production of several crops transforms the co-op into a multiproduct firm. Finally, in Part IV, we analyze the extent to which the supply of workers affects per capita income.

## I. *Private Plots and a Stylized Model of the Kolkhoz*

The peasant on a Soviet kolkhoz earns income from two sources, (a) his share or dividend from collective activities of the kolkhoz and (b) proceeds from crops grown on his private plot. To analyze the impact of private plots, we first develop a stylized model which assumes the following:

1. Crop $X$ is collectively produced and differs from crop $Y$ grown on private plots.[2]

¹ The models examined by Ward [12], Sen [11], Helmberger [3], and Youde and Helmberger [13] deal with a single product firm. Although Domar acknowledges the presence of several outputs in his mathematical appendix [2, p. 755], his text deals only with the production of a single collective crop. To study the case of more than one crop, we adopt analytic tools which are more frequently encountered in the theory of international trade.

² This separation of crops is a first approximation to the actual situation. Nearly all cotton is, for example, collectively produced while a large fraction of potatoes for the household free

2. Land available to the kolkhoz complex is fixed in supply and divided between collective crops and private plots. Each peasant is assumed to receive $t^*$ hectares for his private plot. Thus, a larger membership leads to a smaller input of land to the collective crop.

3. All members are identical and each is presumed to supply $n$ mandays of labor per year to the kolkhoz complex irrespective of his annual income.[3] The total labor input $N$ is thus determined by membership $M$, namely $N = nM$.

4. Product prices and rent are exogenously determined policy variables. Demands for both crops are assumed to be infinitely elastic at fixed prices $(P_x, P_y)$. The rent $R$ is a lump-sum tax that is jointly paid by all kolkhoz members. Guided by self-interest, the peasants act to maximize average daily income $w$.

$$(1) \qquad w = \frac{P_x X + P_y Y - R}{N}$$

Outputs of the collective crop $X$ and the private crop $Y$ are determined by labor $N$ and land $T$ inputs via the production functions.

$$(2) \qquad X = f(N_1, T_1), \qquad \frac{\partial X}{\partial N_1} = f_n. \qquad \frac{\partial X}{\partial T_1} = f_t.$$

$$(3) \qquad Y = g(N_2, T_2), \qquad \frac{\partial Y}{\partial N_2} = g_n. \qquad \frac{\partial Y}{\partial T_2} = g_t.$$

From assumptions (2) and (3), the factor inputs must satisfy the following constraints.[4]

$$(4\text{-a}) \qquad T_2 = kN \qquad\qquad T_1 = T - T_2 = T - kN.$$

$$(4\text{-b}) \qquad N = N_1 + N_2 \qquad N_2 = N - N_1.$$

If these constraints and production functions are substituted in (1), we have

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market is grown on private plots. This assumption is more carefully scrutinized in Part III of this paper.

[3] With identical workers, skill differential in pay (the system of work credits) can be neglected. Moreover, all workers are presumed to have identical utility functions. Sen [11] invokes this same assumption in his study of a co-operative enterprise. Finally, a sufficient condition for a completely inelastic supply of labor by each worker is that the utility function (with leisure and money income as arguments) be of the Cobb-Douglas form. Both the elasticity of substitution of leisure for money income and the "income elasticity" of the demand for leisure equal unity. Substitution and income effects thus cancel one another resulting in a zero elasticity of supply for labor. Since each member works $n$ mandays per year, maximization of average daily income $w$ also maximizes annual per capita income.

[4] From (2), each of the $M$ members receives $t^*$ hectares for his private plot. Hence, $T_2 = t^*M$, but from (3) $N = nM$ where $n$ is fixed. Upon substitution, $T_2 = (t^*/n)N$. Thus, $k = t^*/n$ is the institutionally fixed rate at which land is diverted to private plots as $N$ is increased.

$$(5) \qquad w = \frac{P_x f(N_1, T - kN) + P_y g(N - N_1, kN) - R}{N}.$$

$P_x$, $P_y$, and $R$ are exogenously determined policy variables. The total land supply $T$ and the rate $k$ at which land is diverted to private plots are institutionally fixed. Thus, the two decision variables in our stylized model are the total labor supply $N$ and the labor input $N_1$ to the collective crop. Given $N$, kolkhoz members must choose the amount of labor $N_1$ to be allocated to the collective crop. The remainder, $N_2 = N - N_1$, is devoted to private plots. The kolkhoz can also vary the total labor input by expanding or contracting membership.[5]

The first task facing the kolkhoz is to allocate a fixed labor supply between collective and private crops. In equilibrium, labor will be allocated so that the value of labor's marginal product (VMP) in the collective crop, $P_x f_n$, is equated to the VMP in private plots, $P_y g_n$.[6]

$$(6\text{-}a) \qquad P_x f_n = P_y g_n.$$

The marginal rate of product substitution as labor is moved from private to collective crops is thus equated to the ratio of product prices.

$$(6\text{-}b) \qquad -\frac{dY}{dX} = \frac{g_n}{f_n} = \frac{P_x}{P_y}$$

To determine if an increase in the labor supply would raise or lower per capita income, we differentiate (5) with respect to $N$.

$$(7\text{-}a) \qquad \frac{\partial w}{\partial N} = \left(\frac{1}{N}\right)[P_y g_n + k(P_y g_t - P_x f_t) - w].$$

If both production functions are homogeneous of the first degree, we can invoke Euler's theorem and simplify (7-a).[7]

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[5] Following Ward, we assume that new members are freely available and that membership could be reduced by some device for selecting leavers or simply by not replacing those members who voluntarily leave the kolkhoz.

[6] Differentiation of equation (5) yields,

$$\frac{\partial w}{\partial N_1} = \left(\frac{1}{N}\right)[P_x f_n - P_y g_n].$$

Setting this derivative equal to zero, and multiplying by $N$ yields equation (6-a). Notice that if $N$ is fixed, the land inputs to the two crops are also fixed.

[7] In this case, the production functions, (2) and (3), can be expressed in terms of marginal products.

$$X = N_1 f_n + T_1 f_t = N_1 f_n + (T - kN) f_t.$$
$$Y = N_2 g_n + T_2 g_t = (N - N_1) g_n + kN g_t.$$

Substituting in equation (1), we get,

(7-b) $$\frac{\partial w}{\partial N} = \left(\frac{T}{N^2}\right)\left[\left(\frac{R}{T}\right) - P_x f_i\right].$$

Thus, the necessary condition for an optimal kolkhoz membership becomes,

(7-c) $$\frac{R}{T} = P_x f_i.$$

If the rent per hectare $R/T$ exceeds the VMP of land in the collective crop, the kolkhoz should expand membership. The new members are given private plots thereby reducing the land input to the collective crop and raising $f_i$. In this manner, the per capita income of existing members is increased until the equilibrium of (7-c) is attained.[8]

The full equilibrium of our stylized model can be described by two diagrams. The curve $AB$ in Figure 1 depicts the maximum attainable outputs of $X$ and $Y$ that can be produced by given supplies of land and labor. Since land is not optimally allocated, $AB$ is not a truly efficient production possibility curve.[9] An expansion in kolkhoz membership shifts the production possibility curve outward. At first, larger labor inputs increase the maximum outputs of both goods as in the move from $AB$ to $A'B'$. However, successive increments of labor will eventually reduce the maximum attainable output of $X$ as in the shift from $A'B'$ to $A''B''$ because land is diverted to $Y$.[10] The maximum output of $Y$ rises steadily as $N$ is increased.

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$$w = \left(\frac{N_1}{N}\right)[P_x f_n - P_y g_n] + [P_y g_n + k(P_y g_i - P_x f_i)] + \left(\frac{T}{N}\right)P_x f_i - \left(\frac{R}{N}\right).$$

If (6-a) applies (i.e., labor is optimally allocated), the first term disappears. The second term in brackets cancels when this expression is substituted for $w$ in (7-a). Finally, $(T/N)$ can be factored out to yield equation (7-b).

[8] Another interpretation of this equilibrium condition is provided by equation (7-a). An increase in the labor supply contributes to aggregate kolkhoz income in two ways. The direct effect is the rise in income by labor's VMP, $P_y g_n$. The increment in $N$ also transfers $k$ hectares of land from $X$ to $Y$. Since land is not allocated by income-maximizing rules, this transfer changes aggregate kolkhoz income by $k(P_y g_i - P_x f_i)$. The sum of these two contributions to aggregate income must exceed per capita income $w$ if an expansion in $N$ is to raise the per capita income of existing kolkhoz members.

[9] On a truly efficient production frontier, labor's marginal rate of product substitution (given by the left side below) must be equal to land's marginal rate of product substitution.

$$\frac{g_n}{f_n} = \frac{g_i}{f_i}$$

The kolkhoz is prevented from achieving full productive efficiency because of its inability to allocate land across crops.

[10] At point $B$ in Figure 1, the entire labor supply is devoted to $X$, $N=N_1$. However, the land input to $X$ is fixed at $T_1=T-kN$, with $T_2=kN$ hectares set aside for private plots. An increase in $N$ will lead to a rightward shift from $B$ to $B'$ if,
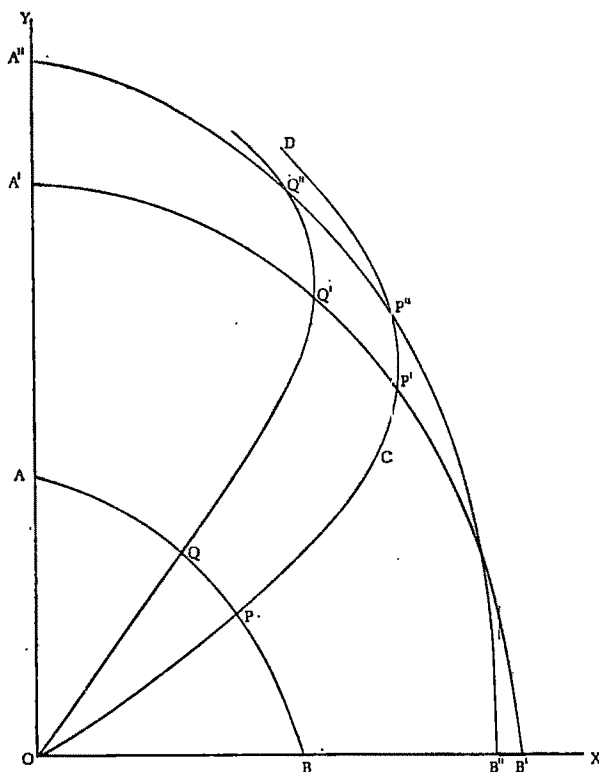
FIGURE 1

To maximize per capita income, labor's marginal rate of product substitution (indicated by the tangent to a production possibility curve) is equated to relative product prices; confer (6-b). If points tangent to parallel price lines on successive curves are connected, we define an expansion path where labor is optimally allocated between the two crops, $(OPP'')$. An expansion path is said to be *normal* if an increase in $N$ leads to larger outputs of both crops as it does over the range $OC$ in Figure 1. When an increase in $N$ leads to a smaller optimal output of $X$ as in the segment $CD$, the expansion path is said to be *backward*. Each expansion path is defined for a given ratio of product prices $(P_x/P_y)$. If the price of $X$ were lower, the kolkhoz would have allocated more labor to $Y$ resulting in a movement from $P$ to $Q$ on the curve $AB$. The expansion path corresponding to this lower relative price

$$f_n - kf_t > 0.$$

where the marginal products are evaluated for the input combination, $N_1 = N$ and $T_1 = T - kN$. As $N$ rises, $T_1$ necessarily falls raising the marginal product of collective cropland $f_t$. Eventually, the inequality will be reversed, and we get shifts like that from $B'$ to $B''$.
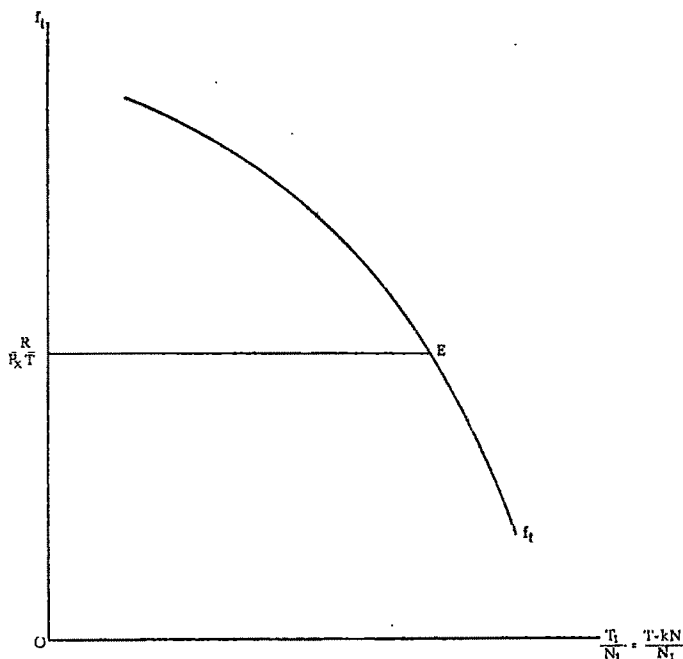
of $X$ lies to the left as depicted by the curve $OQQ''$. Hence, relative product prices $(P_x/P_y)$ determine the particular expansion path along which the kolkhoz operates. The optimal scale of operation (i.e., the specific production possibility curve) is determined by the VMP of collective cropland and the rent on land. If the production function is homogeneous of the first degree, $f_t$ depends only on the ratio of land and labor inputs as shown in Figure 2. If the real rent $(R/P_xT)$ (measured in units of $X$) exceeds the marginal physical product of land $f_t$, the kolkhoz expands membership thereby reducing $T_1 = T - kN$ until an equilibrium is reached at point $E$.

The effects of policy variables on outputs, incomes, and kolkhoz membership can be analyzed with the aid of our stylized model. Consider first a rise in the rent on land $R$ which results in an upward shift of the real rent line in Figure 2. Kolkhoz members are obviously worse off, but the higher rent has no effect on outputs $(X, Y)$ in the short run when membership cannot be varied. The misery can, however, be shared by adding new members to reduce the per capita burden of the higher rent. The land input to the collective crop is reduced because new members are awarded private plots. Kolkhoz production is thus raised along an expansion path such as $OCD$ in Figure 1. The aggregate income from collective and private crops will increase, but per capita income will be

lower than before.[11] The output of the collective crop $X$ rises on a normal expansion path but falls on a backward expansion path. This result differs from Ward's in which a higher rent always raised the output of $X$.[12]

Turn next to the effect of an increase in the price of the collective crop. In the short run with fixed membership, the kolkhoz is limited to output bundles on a given production possibility curve such as $A'B'$. More of $X$ can, however, be produced in response to the higher price by reallocating labor from $Y$ to $X$ as in the rightward movement from $Q'$ to $P'$ in Figure 1. This is a pure substitution effect. The rise in $P_x$ and its accompanying short-run adjustment in outputs displace the equilibrium for the optimum scale of operation. In the long run, kolkhoz members have an incentive to contract membership to hoard the spoils from a higher $P_x$.[13] For a normal expansion path, a contraction in labor supply means smaller outputs of both goods. The pure substitution effect ($Q'$ to $P'$) and the scale effect ($P'$ to $P$) work in opposing directions. The net change in the output of $X$ is indeterminate for this case of a normal expansion path. If, however, the original equilibrium were on a backward expansion path (such as the segment $CD$ in Figure 1) the scale effect reinforces the substitution effect, and the output of $X$ increases. By explicitly introducing private plots, we find that the supply curve of $X$ depends on the nature of the expansion path.[14]

Finally, an increase in the price of private crops $P_y$ leads in the short run to an allocation of more labor to $Y$; i.e., a leftward move on a production possibility curve. The smaller labor input $N_1$ to the collective crop lowers $f_t$ meaning a downward move along the $f_t$ schedule of Figure 2. In the long run, it behooves kolkhoz members to share the spoils by enlarging membership thereby increasing the land input to private crops. A larger labor supply implies an upward move along an expansion path. The output of $Y$ definitely increases, but substitution and scale

[11] In the short run with fixed membership, per capita income falls by $dw/dR = -(1/N)$. Land is now a more expensive input for the kolkhoz. In our model (confer note 5), new members can be attracted to cultivate the fixed land supply more intensively. The net fall in per capita income can thus be made smaller than $1/N$ by expanding membership.

[12] Since in Ward's model, the co-op produced only one good, more intensive use of land necessarily meant that the output of this one crop would rise. The aggregate income from both crops rises in our model, but in a backward expansion path, the output of $X$ falls while that of $Y$ rises sharply.

[13] The equilibrium of Figure 2 is displaced in two ways. First, the larger output of $X$ in the short run is achieved by increasing $N_1$ which, in turn, results in a leftward move up the $f_t$ curve. Second, a higher $P_x$ lowers the real rent line ($R/P_x T$). Land is now cheaper. A contraction in membership returns land from private plots to the collective sector thereby lowering $f_t$.

[14] A backward expansion path unambiguously implies an upward sloping supply curve of $X$. However, for a normal expansion path, the supply curve will be upward sloping (i.e., a rise in $P_x$ results in a larger output of $X$) if and only if the substitution effect outweighs the scale effect. Notice that the output of $Y$ always declines when $P_x$ is increased.

effects again operate in opposing directions on the output of $X$ for a normal expansion path. It can be mathematically shown that the substitution effect will always dominate, and the output of $X$ contracts when $P_y$ is increased.[15]

The long-run effects of policy variables on outputs, income, and membership are summarized in Table 1. Since the institutional rules governing the allocation of land between collective and private sectors lead to a nonoptimal situation, it is not surprising to find some perverse responses. In our stylized model, the kolkhoz resembles a multiproduct firm selling two goods. A hint of general equilibrium creeps into the analysis. The supply of a particular crop is influenced by factors affecting the supplies of other products produced by a multiproduct kolkhoz.

TABLE 1—EFFECTS OF CHANGES IN PRODUCT PRICES AND RENT ON
OUTPUTS AND KOLKHOZ MEMBERSHIP

| | Effect of an Increase in | | |
| | $R$ | $P_x$ | $P_y$ |
|---|---|---|---|
| Output of the collective crop $X$ | | | |
|   Normal expansion path | increase | indeterminate | decrease |
|   Backward expansion path | decrease | increase | decrease |
| Output of private crop $Y$ | | | |
|   Normal expansion path | increase | decrease | increase |
|   Backward expansion path | increase | decrease | increase |
| Optimal kolkhoz membership[a] | increase | decrease | increase |

[a] The effect on kolkhoz membership is the same for both normal and backward paths.

## II. *The Kolkhoz Response to Crop Quotas*

The stylized model of Part I examined the implications of one institutional practice allocating land to collective and private sectors. Attention is directed in this section to another constraint, crop quotas. The assumption of infinitely elastic product demands is modified to reflect the quota constraint.

The typical kolkhoz under central planning is obliged to deliver an output of the collective crop that is greater than or equal to a prescribed quota $X^*$. Failure to meet the quota entails penalties which, we shall assume, will induce kolkhoz members to satisfy the quota. The quota is usually tied to a two-part pricing system. The kolkhoz receives a procurement price $P_x'$ for outputs up to $X^*$ and a higher price $P_x''$ for above-quota outputs. Hence, the total revenue from the sale of $X$ is,

[15] This proof proceeds by differentiating the equilibrium conditions, (6-a) and (7-c) with respect to $P_y$. We find that $(\partial N/\partial P_y) > 0$, and $\partial N_1/\partial P_y) < 0$. Since $T_1 = T - kN$, both $T_1$ and $N_1$ fall as $P_y$ is increased.

$$P_x' X^* + P_x'' (X - X^*) = P_x'' X - (P_x'' - P_x') X^*.$$

The potential revenue loss arising from the differential between above-quota and procurement prices, $(P_x'' - P_x') X^*$, will be shown to be analytically equivalent to the rent on land $R$. Finally, the demand for $Y$ (crops grown on private plots) is assumed to be infinitely elastic at $P_y$.

The quota constraint with its two-part pricing system generates a kink in the iso-revenue lines confronting the kolkhoz. The slope of an iso-revenue line is $-(P_x'/P_y)$ for below-quota production but becomes steeper, $-(P_x''/P_y)$ when $X$ exceeds the quota $X^*$. The kolkhoz thus faces a family of iso-revenue lines such as those depicted in Figures 3-A and 3-B.

Suppose that in the absence of a quota, the kolkhoz attains a full equilibrium by producing output mix $Q$ in Figure 3-A.[16] The quota, however, obliges the kolkhoz to produce and deliver an output of at least $X^*$ units of the collective crop. In the short run with fixed membership, the output of $X$ can only be increased by moving along the production possibility curve $AB$. In Figure 3-A, a short-run equilibrium is reached at point $E$ where the kolkhoz just meets the quota. The output of the private crop $Y$ is reduced to release labor for production of the quota $X^*$. Moreover, the aggregate income of the kolkhoz falls by an amount $CC'$ measured in units of good $Y$. Given the slopes and kink in iso-revenue lines, $C'ED'$ is the highest attainable short-run income for the kolkhoz.

Figure 3-B portrays a case in which the above-quota price $P_x''$ is higher than in Figure 3-A. The kolkhoz initially responds to the quota by moving to $E$. However, at $E$ the marginal rate of product substitution (the slope of $AB$ at point $E$) is less than the price ratio $-P_x''/P_y$. The kolkhoz can benefit by producing a surplus of $X$, selling it at the above-quota price, and further contracting the output of $Y$. The loss in aggregate income (indicated by the vertical distance $CC''$) is less than that in Figure 3-A. Indeed, if the above quota price were sufficiently high, the total short-run income of the kolkhoz could be higher with the quota than without.[17] Variations in the procurement price $P_x'$ affect the slopes of iso-revenue lines only to the left of $X^*$ where the kolkhoz is pre-

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[16] In Figure 3-A, it is assumed that prior to the quota, the price of the collective crop was equal to the procurement price $P_x'$. Moreover, the kolkhoz is presumed to have an optimum membership determining the labor supply $N$ which, in turn, fixes the particular production possibility curve $AB$.

[17] A rise in $P_x''$ leads to even steeper iso-revenue lines to the right of $X^*$. The optimum short-run output mix is reached by moving even further to the right on the production possibility curve. Since the kink in iso-revenue lines always occurs at $X^*$, the vertical intercept $C''$ climbs. Under a quota with its two-part pricing system, the average realized revenue per unit of $X$ is equal to or greater than the procurement price $P_x'$. Recall that in the initial full equilibrium, $P_x = P_x'$.
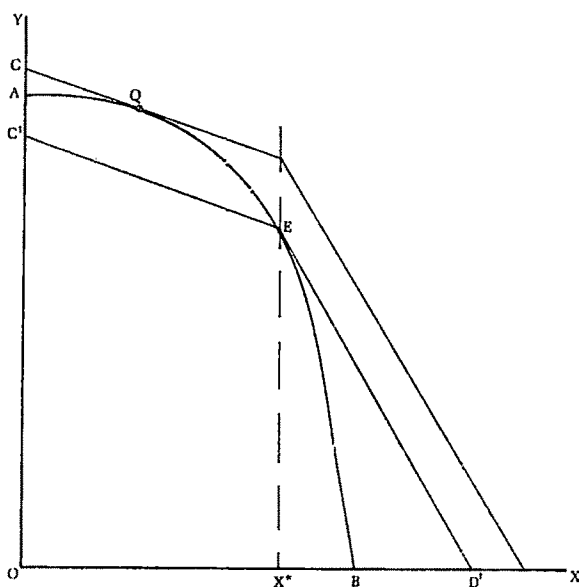
FIGURE 3-A

sumed not to operate. Hence, changes in the procurement price have no effect on short-run equilibrium output mixes in either Figure 3-A or 3-B.

Turn next to the long-run effect of a quota. If the kolkhoz meets or exceeds the quota, per capita daily income is given by,

$$(8) \qquad w = \frac{P_x'' X + P_y Y - [R + (P_x'' - P_x')X^*]}{N}.$$

The kolkhoz strives to maximize $w$ subject to the added constraint,

$$(9) \qquad X \geq X^* \quad \text{or} \quad f(N_1, T_1) \geq X^*.$$

The spread between above-quota and procurement prices creates a potential revenue loss, $(P_x'' - P_x')X^*$, that is equivalent to a lump-sum tax and becomes part of the fixed charge $\hat{R} = R + (P_x'' - P_x')X^*$. Two long-run equilibrium positions are now possible; one in which the kolkhoz produces a surplus of $X$, and the other in which the quota is strictly binding. In the former case, the inequality in (9) holds, and the kolkhoz always operates in the region to the right of $X^*$. The necessary conditions for a full equilibrium are,[18]

$$(10\text{-a}) \qquad P_x'' f_n = P_y g_n$$

[18] These equilibrium conditions apply only when the self-interest of kolkhoz members dictates over-quota production of $X$. The former case of a binding quota constraint [meaning that the equality in (9) holds] is analyzed in the appendix. The results are only slightly different.
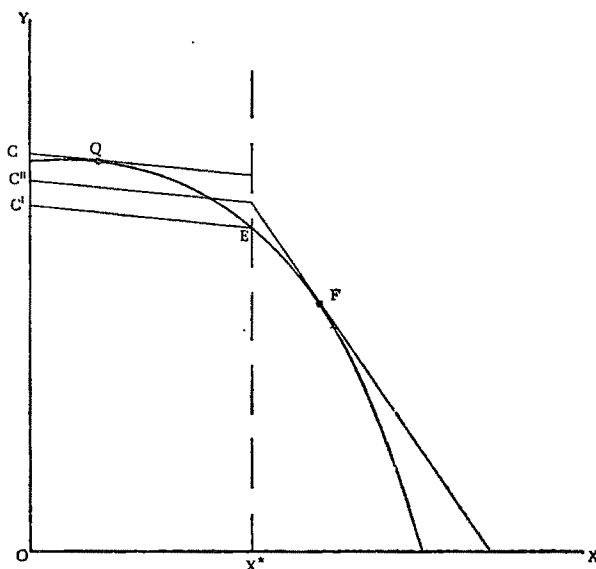
**FIGURE 3-B**

(10-b)          $$\frac{R + (P_x'' - P_x')X^*}{T} = P_x'' f_t.$$

Adjustment to the full equilbrium can again be separated into substitution and scale effects. In the short run, the kolkhoz adjusts to the higher above-quota price by substituting $X$ for $Y$; the move from $Q$ to $F$ in Figure 3-B. This pure substitution effect raises the marginal product of collective cropland $f_t$ which by itself would imply a contraction in membership.[19] However, the potential revenue loss due to the spread between above-quota and procurement prices results in an upward shift of the real rent line in Figure 2.[20] Hence, the contraction in membership would be smaller than in the stylized model without quotas. It is entirely

[19] In order to produce more of $X$, $N_1$ must be increased. Hence, $(T_1/N_1)$ falls resulting in a leftward move up the $f_t$ schedule of Figure 2.

[20] The price of $X$ prior to the quota was assumed equal to the procurement price $P_x'$. Hence, the real rent under a quota will be higher if,

$$\frac{R + (P_x'' - P_x')X^*}{P_x''T} > \frac{R}{P_x'T}.$$

This inequality is satisfied if

$$X^* > \frac{R}{P_x'}.$$

That is, the rent on land must be less than the proceeds from the sale of the quota $X^*$ at the procurement price $P_x'$. In this event, the real rent line of Figure 2 shifts upward when the quota is imposed. If the movement up the $f_t$ schedule exceeds the rise in real rent, kolkhoz membership would be reduced to reach the full equilibrium.

possible that there would be no change in membership as a result of the quota.[21]

A quota with its two prices is a diabolically clever device for promoting greater production. In the model of Part I, a rise in $P_x$ increased the output of $X$ in the short run via the substitution effect. Under a quota, only the above-quota price $P''_x$ is relevant. The short-run response to the above-quota price is the same as in the stylized model when $P''_x$ elicits a surplus. The induced scale effect, however, differs. In the model without quotas, a higher $P_x$ raised per capita income and lowered the real rent line of Figure 2. Kolkhoz members thus had an incentive to contract membership reducing the output of $X$ on a normal expansion path. Under a quota, only a part of the larger output receives the higher, above-quota price. The potential revenue loss due to the discriminatory pricing policy is indistinguishable from an increase in rent $R$. Consequently, the real rent line of Figure 2 will in general rise. The incentive to contract membership is less; indeed, the kolkhoz under some circumstances may expand membership. The induced scale effect is thus smaller and may even go in the opposite direction. A quota is thus a more effective means of expanding the output of $X$ than an increase in $P_x$ without a quota constraint.[22]

### III. *The Separation of Crops Re-examined*

In the preceding sections, we retained assumption (1) that different crops, $X$ and $Y$, were produced by collective and private sectors. Although this assumption approximates the actual situation, there are some notable exceptions. Students of the Soviet agricultural scene observe that not all of the potatoes and fresh vegetables are grown on private plots.[23] They mention instances in which some kolkhozes simultaneously produce cotton $X$ and potatoes $Z$ on collective land, while private plots are sown with potatoes $Y$. Our question now is, "How does this proliferation of crops on collective land affect the results of our earlier analysis?"

The answer to this question rests critically on the institutional marketing arrangements which prevail. A large fraction of collectively produced potatoes goes to "industrial uses" such as vodka, alcohol, and starches. Only a small fraction of collectively grown potatoes $Z$ is,

[21] If $C''$ coincides with $C$ in Figure 3-B, the short-run adjustment involves no change in aggregate kolkhoz income, and there is no incentive to alter membership. This situation is one of multiple equilibria.

[22] The outcome due to the imposition of quotas could have been achieved in the stylized model if $P_x$ and $R$ were simultaneously increased. In a sense, the spread between above-quota and procurement prices accomplishes this. The higher above-quota price elicits a pure substitution effect, while the potential revenue loss moderates the scale effect.

[23] For a fuller discussion, the reader is referred to Karcz [4] and [5]; see especially [4, p. 332].

therefore, technically identical to private potatoes $Y$ which are sold on the free household market. This technical identity is, however, insufficient to establish them as perfect economic substitutes. We are led to understand from conversations with Russian expatriates that labor and material resources (guards and fences) are used to prevent peasants from smuggling collective potatoes into their private coffers. Moreover, the procurement price for collective potatoes is typically below the free-market price $P_y$. From the viewpoint of kolkhoz members, collective potatoes $Z$ are different economic goods from private potatoes $Y$.

In the light of these considerations, the simultaneous production of two or more crops on collective land necessitates only a slight modification of the model. The per capita daily income is now given by,

$$(11) \qquad w = \frac{P_x X + P_y Y + P_z Z - R}{N}$$

where $X$ and $Z$ are collective crops, and $Y$ is grown on private plots. The production functions and constraints, (2) to (4), must also be amended.[24] In equilibrium, the collective sector can achieve Pareto optimality in producing $X$ and $Z$.

$$(12) \qquad -\frac{dZ}{dX} = \frac{h_n}{f_n} = \frac{h_t}{f_t} = \frac{P_x}{P_z}$$

That is, the marginal rate of product substitution, $-(dZ/dX)$, will be the same for labor and land inputs, and this common rate will be equated to relative product prices. The remaining equilibrium conditions of the stylized model, (6-a) and (7-c), are only slightly modified. The principle of LeChatalier insures that the opportunity to produce another crop $Z$ must necessarily raise the per capita income of kolkhoz members.[25] Moreover, greater efficiency in the collective sector would tend to contract the output of the private crop $Y$.

[24] We must introduce a production function for $Z$, namely,

$$Z = h(N_3, T_3)$$

If $Z$ and $Y$ are technically identical and if factors are homogeneous, this function would be the same as (3). However, we retain the $h$ notation to distinguish collective from private potatoes. The kolkhoz can now determine four decision variables: $N =$ total labor supply which depends on membership, $N_1 =$ the labor input to the collective crop $X$, $N_2 =$ the labor input to the private crop $Y$, and $T_1 =$ the land input to $X$. Since $N = N_1 + N_2 + N_3$, we can obtain $N_3$ residually. Moreover, the land input to $Y$ is institutionally determined by $T_2 = kN$. If the kolkhoz determines $T_1$, then the land input to $Z$ is determined by the identity, $T = T_1 + T_2 + T_3$.

[25] The generalized principle of LeChatalier states that the maximum of a function with no auxiliary constraints must be equal to or greater than the maximum subject to some side constraints; confer Samuelson [10, pp. 36–39]. The absence of a second collective crop $Z$ can be regarded as a side constraint, namely $Z = 0$. By allowing the kolkhoz to grow potatoes on collective land, we remove this side constraint and permit $Z \geqq 0$. For another application of LeChatalier's principle to the planning of production, consult Oi [7].

Finally, to come closer to reality, the stylized model with three crops can be appended with additional constraints to reflect crop quotas on both $X$ and $Z$. If each quota is tied to a discriminatory pricing scheme, and if the kolkhoz must meet the quotas, the analysis becomes unduly complicated with no substantial changes in the results obtained in the preceding section.[26]

## IV. *The Supply of Labor and Kolkhoz Income*

Up to now, we have assumed that membership could be expanded or contracted to achieve an optimum labor supply $N$, which fixed the scale of operation. This assumption implies the existence of a reserve army of unemployed peasants awaiting invitations to become kolkhoz members. It also assumes that membership could be reduced either by the expulsion of some members or by the failure to replace those members who of their own volition (or death) leave the kolkhoz. Domar [2], Robinson [9], and Sen [11] have questioned this assumption and substituted a polar alternative assumption that membership is fixed. However, fixed membership need not imply a completely inelastic supply of labor.[27]

In our model, the short-run labor supply to the kolkhoz complex is fixed by fixing membership. The supply of labor to the collective sector is, however, variable within the limits $0 \leq N_1 \leq N$. The quantity is determined by the opportunity cost of foregoing $Y$ and is a function of relative product prices as shown in Figure 4. Under a quota, the labor supply must be sufficient to meet the quota $(N_1 \geq N^*)$, and the supply curve to the left of $N_1^*$ no longer applies.[28] The short-run supply curve of Figure 4 is an outcome of income-maximizing behavior; each point corresponds to an optimum allocation of labor between the two sectors.

[26] As additional constraints are added to the model, the proliferation of Lagrangian multipliers makes it more difficult to establish clear-cut operational propositions. The second constraint in the general theory of the second-best rapes classical welfare economics of many of its most valuable propositions; confer Lipsey and Lancaster [6]. The negative implication of the theory of second-best that almost nothing can be said when there are two constraints, can be avoided by assuming separability of utility functions; see Oi and Hurter [8] and Davis and Whinston [1].

[27] In Sen's model [11], the labor supply (measured in mandays) can be varied because of the labor-leisure choice. We rule out this possibility by assuming a Cobb-Douglas utility function which implies a zero elasticity of labor supply for each member; consult note 3. Domar argues that fixed membership is a plausible short-run assumption, but the supply of labor (in mandays) is upward sloping, (see [2, p. 742]). Each member in Domar's model is presumed to supply a minimum quantity of labor in order to retain his membership rights. However, the members can be hired by the kolkhoz at wages in addition to their dividend income. Under these conditions, it is not obvious that peasants would strive to maximize their "dividend income" alone.

[28] Under a quota, the ratio of product prices becomes $(P_x^*/P_y)$. The point $N^*$ in Figure 4 moves to the right as $N$ is increased. A larger labor supply means that the land input to the collective crop is smaller $(T_1 = T - kN)$ because new members receive private plots. With a smaller land input, the kolkhoz requires a larger minimal labor input $N_1^*$ to meet the fixed quota $X^*$.
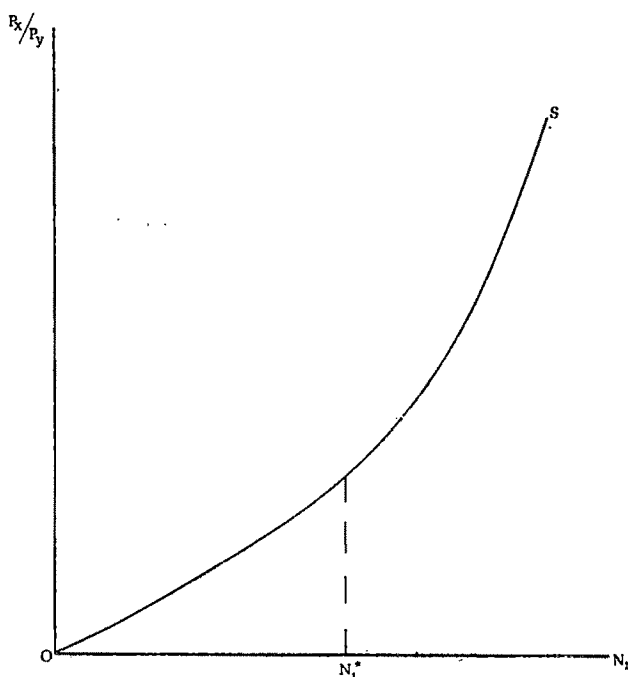
FIGURE 4

Suppose that the long-run labor supply to a kolkhoz is an increasing function of $w$ as depicted by the curve $S$ in Figure 5. The shape and position of this curve are determined by alternative job opportunities and individual preferences.[29] Motivated by self interest, kolkhoz members act collectively to maximize per capita income $w$. In the model of Part I, $w$ is a function of four factors: (a) the policy variables $P_x$, $P_y$, $R$, (b) the total supply of land $T$, and the rate $k$ at which land is diverted to private plots, (c) the allocation of labor between collective and private crops, and (d) the total labor supply $N$. If the first two factors are kept constant, and if labor is optimally allocated (i.e., the kolkhoz is always on an expansion path), the per capita income $w$ can be expressed as a function of $N$, the total labor supply. It follows from equation

[29] We retain the assumption that an individual's supply of labor to the economy is completely inelastic at $n$ mandays per year. Hence, membership $M$ and total labor supply $N$ bear a one-to-one relation, namely $N = nM$. Each worker is assumed to seek that job yielding the highest daily income $w$. If labor markets were competitive, a single kolkhoz would face an infinitely elastic supply curve. At least three things preclude this outcome. First, labor markets are imperfect with entry barriers to certain jobs. A kolkhoz that is a demander of labor may limit membership in order to maximize per capita income of incumbent members. Second, information gaps and moving costs result in some short-run inelasticity of supply. Finally, some workers may prefer to reside in particular localities, and their incomes may contain some economic rent. We ignore the possibility that a kolkhoz might try to exploit its quasi-monopsony position.
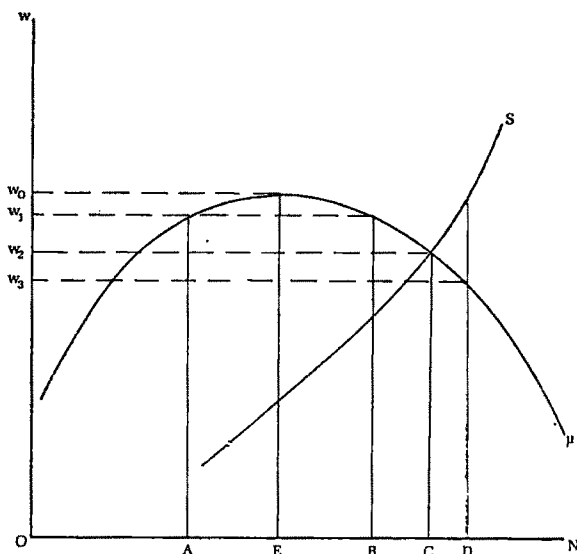
FIGURE 5

(7-a), that the per capita income function will be dome-shaped like the curve $\mu$ in Figure 5.[30] Full equilibrium of our stylized model is attained with a labor input $E$ in Figure 5 where per capita income is a maximum at $w_0$. However, the supply of peasants who are willing to become members is greater than the optimum at an income $w_0$. To examine the adjustment to equilibrium, we distinguish two cases; one in which there is *no* labor turnover, and the other in which workers may die or voluntarily leave the kolkhoz.[31]

The adjustment to equilibrium depends on the initial supply of kolkhoz members. If the initial supply were at $A$ below the equilibrium $E$, the kolkhoz could raise per capita income to $w_0$ by expanding membership.[32] At $E$, there is an excess supply of potential members, but the

[30] From equations (7-a) to (7-c), an increase in $N$ will raise per capita income $w$ if the rent per hectare $(R/T)$ exceeds the VMP of collective land. Successive increments of $N$ will, however, raise the marginal product of collective land, and $w$ will eventually fall. The dome-shaped income curve is the result of a nonoptimal allocation of land and the law of diminishing returns as the total labor/land ratio is increased. It is not the result of a negative marginal product of the fixed factor. Moreover, labor is optimally allocated between sectors at each point on the $\mu$ curve; i.e., (6-a) applies.

[31] Some critics such as Robinson [9] contend that the assumption of freely variable membership is untenable because expulsion is unlikely. Membership could, however, be reduced by simply not replacing workers who leave in the normal course of labor turnover between jobs, firms, and occupations. The neoclassical theory of factor markets implicitly assumes no turnover. When there is labor turnover, the supply curve of Figure 5 must be interpreted as a steady state "mean" supply schedule.

[32] We assume that the kolkhoz adheres to the egalitarian principle of no discrimination. All peasants receive the same daily income $w$ whether they be new or charter members of the co-

self interest of present members would prompt them to limit membership. In a sense, the kolkhoz of Figure 5 is a "rich" kolkhoz enjoying a queue of eager potential members. If the initial labor supply were at $B$, kolkhoz members realize a daily income $w_1$ that is above the supply price for that quantity. Although there is still an excess supply, membership would not be increased as this would diminish per capita income. If there is no turnover, the labor supply $B$ is an equilibrium where members earn economic rent. With labor turnover, workers who leave would not be replaced. The total labor input is reduced and per capita income climbs until we reach point $E$. Finally, consider the initial situation in which the labor supply is at $D$. Here, the per capita income $w_3$ is below the supply price. Some workers would seek alternative employment, and the contraction in labor supply raises $w$. At point $C$, per capita income $w_2$ is just equal to the supply price needed to attract that quantity of workers, and the kolkhoz is in equilibrium with no labor turnover. With turnover, separating workers would not be replaced, and the kolkhoz attains the optimum labor input $E$.

To sum up, a kolkhoz can always achieve an optimum labor input $E$ so long as membership is variable. The kolkhoz would limit membership even though outsiders would be willing to become members at incomes below $w_0$. Conversely, if there is downward inflexibility in membership (the case of no labor turnover), the equilibrium labor supply is affected by initial conditions. In this latter case, we can conclude only that the total labor supply will be between $E$ and $C$ in Figure 5.

The case of a "poor" kolkhoz is depicted in Figure 6. The maximum per capita income $w_0$ is unattainable because the supply of peasants to the kolkhoz at an income $w_0$ is less than the requisite labor input $E$ needed to reach the maximum. Given the supply curve facing it, the "poor" kolkhoz must content itself with a labor input $A$ which yields a per capita income $w_1$. The members of this "poor" kolkhoz consist of those who have a regional preference, are ignorant of alternative job opportunities, or are unable to obtain better jobs perhaps because of restrictive membership practices by neighboring kolkhozes.[33] The presence or absence of labor turnover will not affect the equilibrium of a "poor" kolkhoz.

The income curves $\mu$ of Figures 5 and 6 assume fixed values for $P_x$, $P_y$, and $R$. Changes in these policy variables produce shifts in the $\mu$ curve which affect per capita income and employment. An increase in rent $R$ leads to a fall in per capita income for every labor input which

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operative. If discrimination were practiced (or if outside workers were hired), the analysis must be modified. It is not enough to draw the curve that is marginal to $\mu$ since the outside or new members may not be given private plots.

[33] Another explanation is that these workers are less productive. However, we rule out this explanation by our assumption that labor is homogeneous.
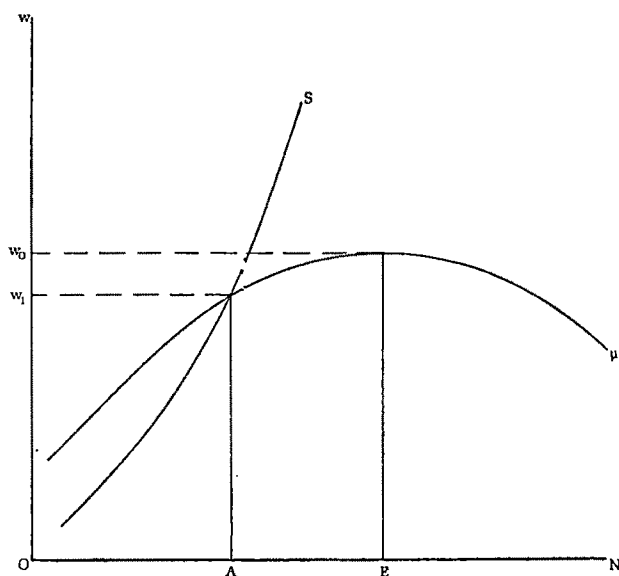
FIGURE 6

is described by the downward shift from $\mu$ to $\mu'$ in Figure 7. Moreover, the optimum labor input corresponding to the maximum attainable income rises from $E$ to $E'$. A further rise in $R$ results in a rightward and downward shift from $\mu'$ to $\mu''$. If the peaks of the income curves ($P$, $P'$, $P''$) are connected, they can be interpreted as the kolkhoz's long-run "demand" for labor. The "demand" curve $JJ$ is relatively elastic since a rise in $R$ (the shift from $\mu$ to $\mu'$) results in a higher aggregate income. The optimum membership ($E$, $E'$, $E''$) increases as we move to income curves corresponding to higher rents. The shift in the $\mu$ curve due to a rise in $P_x$ is the obverse. As $P_x$ rises, the $\mu$ curve shifts left and up. Hence, the highest income curve ($\mu$ in Figure 7) corresponds to the lowest rent $R$ or the highest product price $P_x$. An increase in the price of the private crop $P_y$ leads to an upward and rightward shift of the income curve.[34]

The interaction of "demand" and supply can be examined with the aid of Figure 7. Suppose that in year $O$, income curve $\mu'$ applies with an initial kolkhoz membership at $C$. The kolkhoz is not in full equilibrium and would like to contract membership to $E'$. If central planners now raise rent in year 1, the kolkhoz finds that their income curve has

[34] In Part I, a rise in $P_y$ led to a larger optimum membership and higher per capita income. In this case, the $JJ$ curve slopes upward. That the "demand" slopes upward, is somewhat misleading. Each point on the $JJ$ curve implies fixed values for $P_x$, $P_y$, $R$. Movements along the $JJ$ curve can be triggered only by the central planners and cannot be initiated by the kolkhoz.
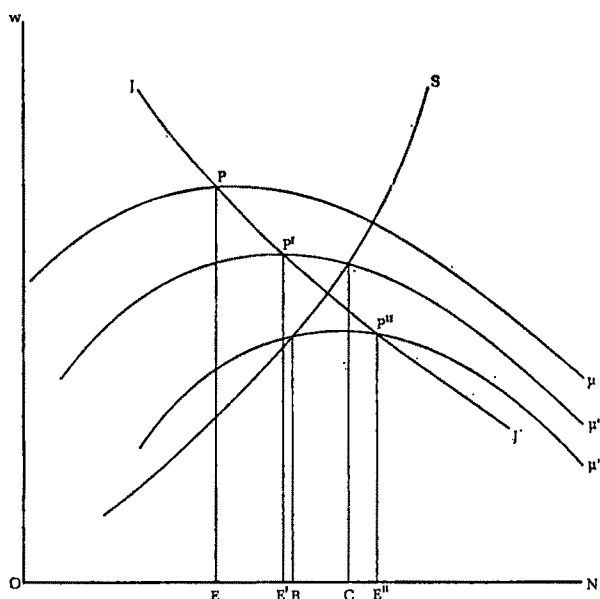
FIGURE 7

shifted down to $\mu''$. The rise in rent has now made this kolkhoz a "poor" one. Some members will leave and reduce the labor input to $B$. If the rent is lowered in year 2 to its previous level of year 0, the income curve shifts back from $\mu''$ to $\mu'$, but the kolkhoz would not expand membership from $B$. The reader can manipulate the $\mu$ and $S$ curves to analyze the implications of other policy changes.

The effect of the supply of labor on per capita income and employment is not substantially altered by the presence of crop quotas. If the above-quota price $P''_x$ elicits over-quota production, the model requires only two modifications. The relevant price is $P''_x$, and the rent $R$ is replaced by the total fixed charge $\hat{R}$ which includes the potential revenue loss. Per capita income may either rise or fall depending on the spread between procurement and above-quota prices and the size of the quota $X^*$. If the quota is strictly binding (the case analyzed in the appendix), the $\mu$ curve shifts down and per capita income falls. In this event, the income curve differs from the case of over-quota production as labor is no longer optimally allocated between sectors.

The introduction of a supply curve of peasants provides a criterion for distinguishing between "rich" and "poor" kolkhozes. A kolkhoz is "rich" if an optimum labor input implies that workers earn economic rents; i.e., the $S$ and $\mu$ curves intersect to the right of the maximum per capita income. The maximum income $w_0$ can only be attained if the members of a "rich" kolkhoz maintain a restrictive membership policy.

An increase in rent $R$ or a decrease in price $P_z$ encourage a "rich" kolkhoz to share the misery of lower daily income by expanding membership. However, the same policies applied to a "poor" kolkhoz would produce opposite outcomes. Membership, output, and per capita income all decline as the $\mu$ curve is shifted downward in Figure 6.

## V. Concluding Remarks

A Soviet collective farm is saddled with constraints imposed by central planners. In this paper, we have analyzed how the welfare (per capita income) of peasants is affected by arbitrary allocations of land to private plots, prescribed crop quotas accompanied by a discriminatory pricing system, and separation of crops on private and collective lands. Policies which raise the rent on land through either an increase in $R$ or a decrease in procurement price $P_z'$ reduce the welfare of kolkhoz members. The loss in welfare can be minimized by more intensive use of the fixed supply of land raising the labor/land ratio through membership expansion. This result (also obtained by Ward [12]) which seems so paradoxical is thus seen to be rational.

Quota constraints with their two-part pricing schemes were introduced by central planners to encourage larger outputs of the collective crop. The analysis of Part II indicated that a quota could achieve this objective through the diabolical spread between above-quota and procurement prices. The spread is equivalent to a rise in the rent on land and moderates the incentive to contract membership when $P_z''$ is increased. The same result could have been achieved in the stylized model by simultaneously raising $P_z$ and $R$.

In Part IV, attention was directed to the relationship of per capita income to the number of members. The supply of peasants which can be attracted by a kolkhoz is, however, a function of the income that they earn. A rich kolkhoz enjoys an excess supply of potential members, but it is in the self-interest of incumbents to restrict membership in order to maximize their per capita income. The incomes of peasants on a poor kolkhoz could be raised by adding new members; see Figure 6. However, the per capita income on a poor kolkhoz is too low to attract new members, and the old members who may prefer to reside in the region must be content with low incomes. Per capita income, output, and employment on a poor kolkhoz can be raised by any of the following policies: lower the rent $R$, raise $P_z$, or increase $P_y$.

A rich kolkhoz could obtain peasants from a poor one, but it may be in the best interests of both parties to merge. If all kolkhozes had identical production functions, and if all inputs were homogeneous, there are only two reasons for the emergence of rich and poor kolkhozes. First, product prices, rent, and quotas could differ across kolkhozes. In

this case, amalgamation should lead to higher incomes because of the gains from labor mobility and varying output mixes.[35] The other reason for amalgamation presupposes an initial disequilibrium. If the labor/land ratio differs across kolkhozes, greater productive efficiency can be gained by merging.[36]

At least two other explanations could account for the trend toward larger kolkhoz size. If there are economies of scale, two or more kolkhozes could merge to realize these economies. Amalgamations also may be a political means of concealing inefficiency. A poor kolkhoz with below-quota production could be merged with a rich one to reduce the number of reportedly inefficient kolkhozes.

Although the model developed in this paper has generated some interesting implications, there are several directions in which it could be extended. If the amount of land set aside for private plots were to be increased, how would this affect per capita income and optimum kolkhoz membership? In some regions, the price of the private crop $P_y$ is surely affected by the quantity of $Y$ supplied by the kolkhoz. If this interaction were incorporated into the model, how would this affect the equilibrium of our stylized model? The amount of capital equipment that is supplied to the kolkhoz by central planners should enter the production functions. How does the omission of this input affect the results of our analysis? These are but some of the unanswered questions which remain to be studied.

## APPENDIX

To analyze the case in which the quota constraint is strictly binding, we form the following Lagrangian expression from (8) and (9).

$$(A.1) \qquad L = \frac{P_x'' X + P_y Y - [R + (P_x'' - P_x')X^*]}{N}$$
$$+ \lambda[f(N_1, T - kN) - X^*].$$

Recalling equations (2) to (4), we differentiate $L$ with respect to $\lambda$, $N_1$, and $N$. By setting the first derivatives equal to zero, we obtain the necessary conditions for an equilibrium.

[35] This case is analogous to the gains from trade in the theory of international trade. If the rent and quota for the merged kolkhozes are equal to the sum of rents and quotas for the merger partners, and if new product prices are bracketed by the previous prices facing the two partners, there will, in general, be some net gain from the amalgamation.

[36] We assume here that every kolkhoz has identical production functions, has the same land endowment $T$, and faces the same product prices, rent, and quotas. If each kolkhoz were in full equilibrium, the marginal products of land and labor would be the same for all kolkhozes. However, if the labor/land ratio varied across kolkhozes, these marginal products would differ. By merging, labor could be reallocated to equalize its marginal product in the two merger kolkhozes.

(A.2)
$$f(N_1, T - kN) - X^* = 0.$$

(A.3)
$$\left(\frac{1}{N}\right) [P_x'' f_n - P_y g_n] + \lambda f_n = 0.$$

(A.4)
$$\left(\frac{1}{N}\right) [P_y g_n + k(P_y g_t - P_x'' f_t) - w] - \lambda k f_t = 0.$$

By invoking Euler's theorem, the per capita income $w$ can be reduced to,

$$w = P_y g_n + k(P_y g_t - P_x'' f_t) + \left(\frac{N_1}{N}\right) [P_x'' f_n - P_y g_n]$$

$$+ \left(\frac{T}{N}\right) P_x'' f_t - \frac{\hat{R}}{N}.$$

Where $\hat{R} = R + (P_{x1}'' - P_x') X^*$ is the total fixed charge.

The undetermined Lagrange multiplier $\lambda$ can be interpreted as the shadow cost of the quota. From (A.3), we have,

(A.5)
$$\lambda = - \left(\frac{1}{N}\right) P_x'' (1 - \delta)$$

where

$$\delta = \left(\frac{g_n}{f_n}\right) \Big/ \left(\frac{P_x''}{P_y}\right).$$

Hence, $\delta$ is the ratio of the slope of the production possibility curve (the marginal rate of product substitution) to relative products prices. For the case depicted in Figure 3-A, $\delta$ is clearly greater than unity so that $(1-\delta)$ $<0$. A binding constraint therefore implies a positive shadow cost of the quota. Next, if (A.5) is substituted in (A.4), we can eliminate $\lambda$. Hence, (A.3) and (A.4) become,

(A.6)
$$\frac{\hat{R}}{N} - \left(\frac{N_1}{N}\right) P_x'' f_n (1 - \delta) - \left(\frac{T}{N}\right) P_x'' f_t + k P_x' f_t (1 - \delta) = 0.$$

After substitution for $w$ and $\lambda$, the entire expression was multiplied by $N$ to arrive at (A.6).

In the short run, the kolkhoz responds to a quota by allocating more of its fixed labor supply to $X$ as in Figure 3-A. At point $E$, the first equilibrium condition (A.2) is clearly satisfied. However, the short-run equilibrium values of $N_1$, $N$, and $\delta$ need not fulfill the second equilibrium condition (A.6). If the expression in (A.6) is positive, it behooves kolkhoz members to expand membership. As $N$ is increased, $\delta$ becomes larger since the slopes of higher production possibility curves become steeper along the line $X = X^*$. The expansion in labor supply $N$ will continue until $\delta$ becomes sufficiently large to achieve the equality of (A.6). Conversely, if (A.6) is found to be negative,

membership could be reduced to lower the value of $\delta$. In full equilibrium, the kolkhoz will be operating at the kink in the iso-revenue line implying that labor is not optimally allocated. This last result is not surprising since by assumption the kolkhoz is obliged to meet the quota.

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# EFFECTS OF TRADE POLICY ON DOMESTIC RELATIVE PRICES: PAKISTAN, 1951-64

By STEPHEN R. LEWIS, JR.*

In the absence of monopoly and of restrictions on the free movement of goods or prices, the price structure of traded goods in a country would be identical to the price structure it faces in international trade. Trade theory shows that the result of opening trade is to move domestic price ratios between goods into equality with world price ratios.[1] Tariffs and other restrictions on trade prevent domestic relative prices from equalling world relative prices. Many countries employ a variety of devices that distort domestic from world price structures, and many developing countries use those devices to protect their manufacturing sectors. The latter policies also tax domestic agriculture, which receives lower prices for its goods than if it were allowed to buy and sell directly in international markets. Policies to transfer income out of agriculture (and into either the government or the manufacturing sector) include multiple exchange rates (or an overvalued currency that implicitly "taxes" exports), revenue-raising export taxes, export marketing boards, tariff protection to domestic manufacturing industries, quantitative restrictions on the imports of manufactures, and imports of PL 480 surplus agricultural commodities to keep domestic food prices relatively low [6]. Most of these devices have operated in Pakistan over the past fifteen years. This paper discusses a method of analyzing the combined effects of all these policies on relative prices, particularly the agricultural sector's terms of trade, and applies it to Pakistan for the period 1951-1964. The basic aim is to measure the extent to which domestic prices were prevented from reaching the relative prices that existed in international trade. The principal building blocks for the em-

[1] See, for example, Haberler's treatment of this problem [2] for a country where domestic relative costs are distorted. He also shows the effects of trade restrictions on domestic relative prices, for the case of two goods.

pirical investigations are implicit exchange rates for individual commodities.

An implicit exchange rate is the ratio between the domestic wholesale price of a commodity in local currency (e.g., Rs. 1.00 per yard of cloth) and the foreign price of the same item, at the port of entry or exit, in some international currency (e.g., $.20 per yard).[2] The exchange rate implied by these prices (Rs. 5.00 per $1.00) is the implicit exchange rate for cloth. If this item were imported, subject to no duties and to no quantitative restrictions, then the implicit exchange rate would be equal to the official exchange rate between the two currencies. To the extent that there are trade restrictions, however, the implicit exchange rate for a good would differ from the official exchange rate. In competitive equilibrium, with no trade restrictions, implicit exchange rates for tradable commodities would all equal the official exchange rate, and there would be no difference between relative prices domestically and internationally.[3,4] Trade restrictions would result in differences between domestic and international relative prices, which would be reflected in differences among implicit exchange rates for various commodities.

One subset of relative prices, the terms of trade between agriculture and manufacturing, is important in some widely used models of the development process [9] [18]. In these models improved terms of trade for manufacturing raise the share of profits in income and help raise the saving rate. This result of the models has been used as an argument in favor of protecting manufacturing and turning the terms of trade against agriculture. In order to estimate the extent to which the terms of trade do get turned against agriculture, one can use implicit exchange rates. If $P_i$ is the implicit exchange rate for manufacturing good $i$ and $P_k$ is the rate for agricultural good $k$, one can obtain an implicit exchange rate for goods originating in each sector by using an appropriate set of weights such as marketings of agricultural products, $S_k$, and the purchases of manufactured goods by the agricultural sector, $B_i$. Taking the ratio of the average implicit exchange rate for agricultural goods,

$$\sum_k P_k S_k,$$

[2] C.i.f. prices should be used for importables and f.o.b. prices for exportables. Domestic prices should be in cities of import or export of the commodity to eliminate the effects of domestic transparent margins.

[3] Implicit exchange rates are not the same as purchasing power exchange rates between countries, such as those computed for the United States and Western European countries by Gilbert and Kravis [1].

[4] This statement should be qualified due to transport cost. E.g., such costs might prevent profitable exports of a good, even though domestic production is efficient enough to eliminate imports without tariffs.

to the average rate for manufactured goods,

$$\sum_i P_i B_i,$$

one finds the expresssion for the ratio of the terms of trade agriculture has domestically to the terms of trade it could receive if allowed to trade directly in international markets.[5]

A numerical example may be helpful. If agricultural goods were all exports (or competed with exports for domestic resources) and manufacturing industries all competed with imports, protection of domestic manufacturing would have the effect of raising the implicit exchange rate for imports and import-competing goods relative to exports and export-competing goods. If the official exchange rate was Rs. 5.00 per $1.00, a 50 per cent duty on imports of manufactures would raise their implicit exchange rate to Rs. 7.50 per $1.00, while the implicit exchange rate for agricultural exports remained at Rs. 5.00 per $1.00.[6] Agriculture's net barter terms of trade become only two-thirds of what they would be if agriculture could trade directly in world markets. If protected manufacturing expanded and lowered its costs, however, tariffs would cease to determine domestic prices, the implicit exchange rate for manufactures would fall, and the domestic price structure would approach the world price structure.[7] Movements in average implicit exchange rates for the two sectors over time could be used to analyse (i) changes in domestic relative to world terms of trade, (ii) the extent to which the agricultural sector was being discriminated against (and the manufacturing sector favored) by government trade policies, and (iii) the process of infant industries growing up.

Since domestic prices in most countries are not set by tariffs, direct comparisons of domestic and world prices must be made. The sources of price information for Pakistan are discussed briefly in the Appendix. Implicit exchange rates for most commodities were estimated directly for one year only, particularly for manufactured goods. Movements of implicit exchange rates over time were projected using (i) domestic price indices [7] and (ii) "world" price indices (as explained in the Appendix). Most of these latter indices for manufactured goods are actually unit values of exports from major exporting countries. While there are many objections to the use of such prices, the empirical results suggest that there would have to be strong biases in the interna-

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[5] This statement assumes perfect elasticity of world offer curves with respect to price.

[6] The price of foreign exchange would change after the tariff, but the differential would still be 50 per cent. The change is ignored for simplicity.

[7] Where markets are not competitive, implicit exchange rates may differ from official exchange rates even in the absence of trade restrictions.

tional indices to offset substantially the *movements* in implicit exchange rates and their implications about industrial growth and import substitution.

## I. *A Brief Review of Industrial Policy and Growth in Pakistan*

Some characteristics of Pakistan's economy must be brought out in order to understand the behavior of relative prices and implicit exchange rates in that country.[8] At the time of Partition in 1947, Pakistan exported agricultural products to India and the rest of the world, and imported virtually all her manufactures. Pakistan broke off trade with India, did not devalue with Britain and India in 1949, and followed a modestly restrictive trade policy through the Korean War boom. In 1952, however, faced with a collapse of export prices and earnings, the government again refused to devalue and adopted a rigid set of quantitative controls on imports to keep payments in line with receipts. Since agriculture was the export sector and manufacturing clearly the import competing sector, the restrictions of trade by the devices chosen (currency overvaluation, export taxes, tariffs, and quantitative restrictions on imports), represented an almost classic case of turning the terms of trade against agriculture and protecting domestic manufacturing. Domestic industry responded sharply to high profitability, growing at rates of 12 to 15 per cent per year through the 1950s and early 1960s. There was considerable import substitution, and some of the new industries even exported by the late 1950s. In 1955 the rupee was devalued, and in 1959 exporters of nontraditional products were given a more favorable price of foreign exchange through a multiple exchange rate system called the Export Bonus Scheme. Beginning in the late 1950s an import surplus, financed by foreign assistance, emerged and quickly expanded.

The original disequilibrium in manufacturing between costs and output prices (accentuated in 1952 by the policy response to the trade crisis) was narrowed from 1952 to 1965 by three sets of forces: (i) increased supplies of domestically produced import substitutes and falling costs in domestic industries; (ii) increased supplies of imports (financed largely through aid, but after 1959 by expanding export earnings), and (iii) changes in the exchange rate that reduced the extent of discrimination against nontraditional exports. In addition, export taxes on agricultural goods were reduced over this period, and indirect taxes on import-substitutes were raised. Both of these movements tended to offset the high degree of subsidy given to domestic producers who used

[8] This very brief summary draws on studies by Rahman [17] and on some of my own work [5] [7] [8]. An excellent review of structural change in Pakistan is given by Khan and Bergen [4]. The industrial sector is also treated by Papanek [13].

exportable raw materials (e.g., cotton) to manufacture import substitutes (e.g., cotton textiles.)

The usual structural changes occurred over this period. The share of agriculture in GNP fell, and that of manufacturing and construction rose; investment rates rose from a negligible amount after Partition to over 15 per cent of GNP in 1965, while saving rates increased from negligible amounts to about ten per cent of GNP. Throughout the period there were comments by economists, government officials, and farmers to the effect that the terms of trade were unfavorable to agriculture. There was also considerable discussion of the relative positions of East and West Pakistan, as East Pakistanis argued that they were being "squeezed" for the benefit of West Pakistan. The subsequent analysis sheds some light on these specific questions as well as the more general problems of measuring the effects of government policies and examining the impact of rapid growth on domestic relative price structures.

## II. *Differences in Implicit Exchange Rates Between Sectors and Over Time*

The basic results of computing implicit exchange rates for manufactured and agricultural goods in East and West Pakistan from 1951 to 1964 are given in Table 1. The rates facing agriculture are shown in Figure 1, where agricultural exchange rates are weighted by agricultural marketings, and manufactured goods exchange rates are weighted by estimated purchases of manufactured goods by the agricultural sector.[9].

Several characteristics of Figure 1 stand out. First, even in the mid-1960s the agricultural sector received around Rs. 5.00 for agricultural goods worth $1.00, but it paid over Rs. 8.00 for manufactured goods worth $1.00. Even if the estimates understated agriculture's rate and overstated that for manufacturing (though the estimating procedure would tend to produce the opposite bias), agriculture must receive about one-third less per unit of output exchanged then it might under "free trade." Second, there has been a considerable narrowing of the gap between the implicit exchange rates for the two sectors since the mid-1950s, which suggests that the growth process worked off some of the disequilibrium of Partition and the trade policies adopted in its aftermath. Around 1954-55, shortly after the trade crises and the adoption of tight quantitative controls on imports, the figures suggest that agriculture received about Rs. 3.25 per dollar but paid around Rs. 9.50 per

[9] As in Lewis and Hussain [7], weights are for 1959-60. Several alternative estimates of purchases of manufactures by agriculture were tried, but the results were, fortunately, quite insensitive to the alternative weightings.

TABLE 1.—IMPLICIT EXCHANGE RATES FOR AGRICULTURAL AND MANUFACTURED
GOODS, EAST AND WEST PAKISTAN
(Rupees per U.S. Dollar, Three-Year Averages)

| Years \ Weights | East Pakistan | | | | West Pakistan | | | | Official Exchange Rate |
|---|---|---|---|---|---|---|---|---|---|
| | Manufactured Goods | | Agricultural Goods | | Manufactured Goods | | Agricultural Goods | | |
| | Gross Output | Purchases by Agriculture | Market-ings | Purchases by Manufacturing | Gross Output | Purchases by Agriculture | Market-ings | Purchases by Manufacturing | |
| 1951–54 | 6.15 | 9.07 | 2.87 | 3.32 | 7.07 | 8.39 | 3.81 | 4.13 | 3.31 |
| 1952–55 | 6.62 | 9.74 | 2.73 | 3.01 | 7.63 | 8.94 | 3.81 | 4.15 | 3.31 |
| 1953–56 | 6.88 | 10.17 | 2.86 | 2.97 | 7.84 | 9.00 | 3.76 | 4.06 | 3.78 |
| 1954–57 | 7.00 | 9.81 | 3.70 | 3.77 | 7.66 | 8.51 | 3.94 | 4.19 | 4.27 |
| 1955–58 | 7.20 | 9.83 | 4.46 | 4.57 | 7.90 | 8.56 | 4.33 | 4.57 | 4.75 |
| 1956–59 | 7.14 | 9.46 | 4.85 | 5.01 | 7.96 | 8.57 | 4.73 | 5.06 | 4.75 |
| 1957–60 | 7.20 | 9.07 | 4.65 | 4.95 | 7.95 | 8.68 | 4.85 | 5.30 | 4.75 |
| 1958–61 | 7.21 | 8.56 | 4.75 | 5.10 | 7.73 | 8.59 | 5.06 | 5.60 | 4.75 |
| 1959–62 | 7.13 | 8.42 | 4.83 | 5.17 | 7.68 | 8.61 | 5.19 | 5.70 | 4.75 |
| 1960–63 | 6.85 | 8.29 | 4.87 | 5.09 | 7.53 | 8.41 | 5.40 | 5.79 | 4.75 |
| 1961–64 | 6.63 | 8.15 | 4.77 | 4.93 | 7.39 | 8.33 | 5.35 | 5.69 | 4.75 |

*Source:* See Appendix.

dollar, for the products it sold and bought. Again, even allowing for
considerable bias in the projections of implicit exchange rates, agriculture in the mid-1950s must have received only 50 per cent of the value
its sales would have bought if they could have been traded internationally without the limitations imposed by government trade policy.
Third, even though a considerable portion of the disequilibrium between sectors was eliminated by 1959, there is still some narrowing of
the gap after 1959, so that the process has been a continuing one for
about a decade. Fourth, East Pakistan's farmers had worse terms of
trade than did West Pakistan's in the 1950s, due both to a lower implicit
rate for agricultural goods in East Pakistan and to a higher implicit
rate for manufactured goods in that province. Interestingly, however,
the implicit rate for manufactured goods in East Pakistan was slightly
lower than that in West Pakistan during the 1960s, for the weights
used here.[10]

The relationship between the official exchange rate and each sector's

[10] This result is due in part to the lower level of prices for imported goods in East
Pakistan as shown by Pal [12]. In addition, price comparisons for such items as tea,
paper, soap, matches, and cotton textiles in recent years show prices in East Pakistan are
slightly lower than in the West wing.
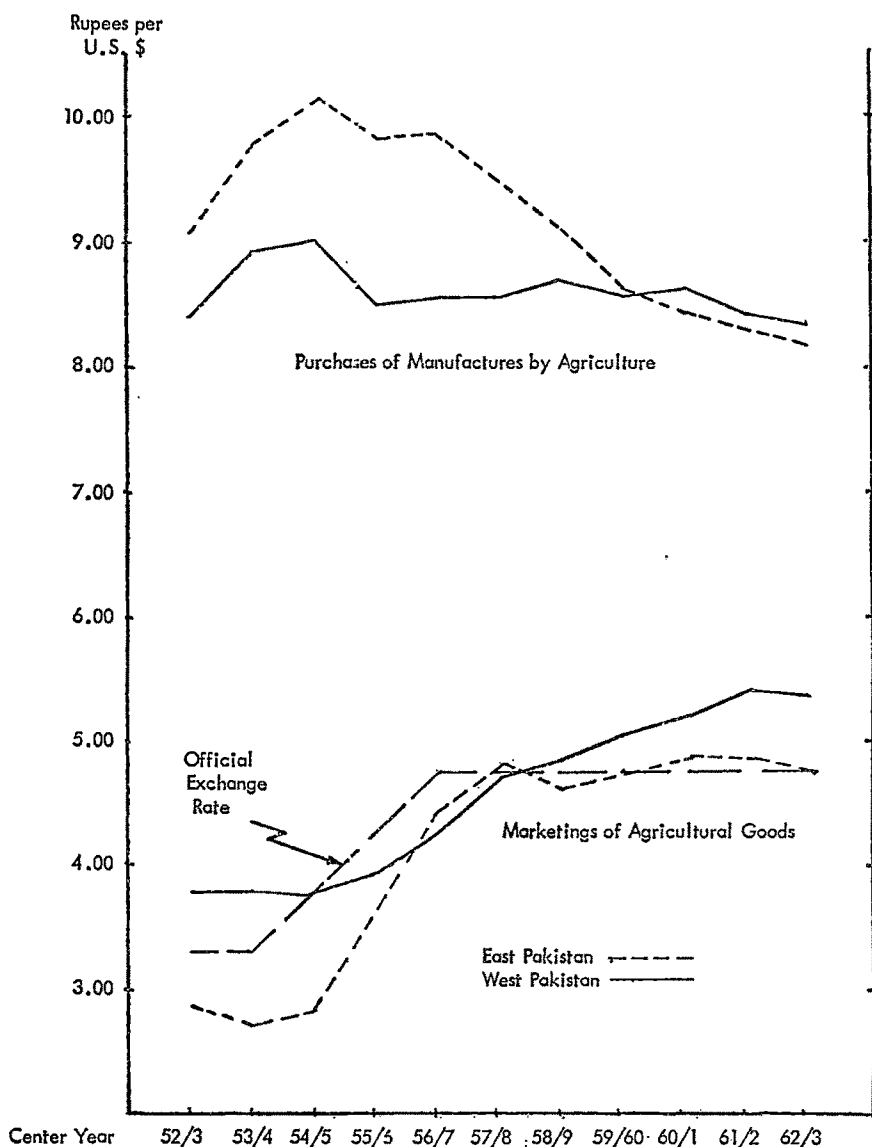
FIGURE 1. IMPLICIT EXCHANGE RATES FACING THE AGRICULTURAL SECTOR
(THREE-YEAR AVERAGES)

implicit rate is of some interest. There is a fairly close relationship be-
tween the official rate and the implicit rate for agricultural goods. Agri-
cultural goods have been principally export or export-competing goods,
and the overvaluation of the domestic currency appears to have re-
sulted in much lower prices for agricultural goods than would have

been the case with a more realistic exchange rate. The close association between agriculture's implicit rate and the official rate suggests that some of the inflation of the late 1950s, which was reflected primarily in rising prices of agricultural goods, may have been a relative price adjustment associated with the official devaluation in 1955. The relation between the official rate and the implicit rate for manufactured goods is also of interest. If the prices of imports and import-competing goods were related to international prices at official exchange rates, the implicit rate for manufactures would have risen over time, as did the official rate. Instead, the implicit rate fell while the official rate rose, so that in years following the devaluation in 1955, the implicit exchange rate for import-competing goods moved in the opposite direction from the price of foreign currency. These results show that for an economy starting out in a controlled disequilibrium devaluation need not result in higher domestic prices of imports and import competing goods.

The terms of trade seen from the manufacturing sector's point of view are not shown graphically, but the movements are similar to those in Figure 1.[11] The differentials between the implicit exchange rates for output the manufacturing sector produced relative to products it bought are much narrower than in the case of the agricultural sector. The manufacturing sector received about Rs. 7.00 for manufactured goods worth $1.00, while it had to pay around Rs. 5.25 for agricultural goods of $1.00 in value in the mid-1960s. If some error is allowed for in each exchange rate, the difference could not be more than about 20 per cent. In the mid-1950s, however, the manufacturing sector paid Rs. 3.50 for its agricultural purchases worth $1.00, and received more than Rs. 7.00 for sales worth $1.00. Again allowing for some error, the manufacturing sector must still receive 75 to 100 per cent more for its output than it paid for purchases of equivalent value in world trade in the mid-1950s. The gap between the exchange rates for the two sectors narrowed over the entire period after 1954-55.

The differentials in the implicit exchange rates, or the differentials in world and domestic terms of trade of the two sectors, are less when seen from the manufacturing sector's point of view than from that of agriculture. There are good reasons for this fact. First, domestic indirect taxes bring the implicit rate facing producers of manufactured goods below the implicit rate facing the agricultural sector. Second, the weights are very different in the two measures [7]. The agricultural goods most discriminated against are jute and cotton. Both crops have fairly high weights in marketings of the agricultural sector, but much of the output is exported, which reduces their weight in purchases by

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[11] The generally lower level of implicit exchange rates for East Pakistan manufacturing is due to the heavy weight of jute textiles in that province.

TABLE 2—IMPLICIT EXCHANGE RATES FROM PRICE COMPARISONS COMPARED
WITH RATES IMPLIED BY TARIFFS AND TAXES
(Rupees per U.S. Dollar)

| | Implied by Tariffs | | | Implicit Rate Estimates | | |
|---|---|---|---|---|---|---|
| | 1954–55 | 1959–60 | 1963–64 | 1954–55 | 1959–60 | 1963–64 |
| West Pakistan | | | | | | |
| Gross output weights, producer prices | 4.95 | 6.64 | 8.90 | 7.45 | 8.36 | 7.57 |
| Agricultural sector purchase weights, market prices | 5.37 | 7.63 | 9.98 | 8.59 | 8.97 | 8.25 |
| East Pakistan | | | | | | |
| Gross output weights, producer prices | 4.72 | 6.70 | 7.69 | 6.57 | 7.51 | 6.55 |
| Agricultural sector purchase weights, market prices | 5.28 | 7.58 | 10.10 | 9.63 | 8.94 | 7.73 |

*Source:* Exchange rates implied by tariffs were computed by multiplying each industry group by its average tariff from Radhu [15], and weighting the exchange rates for industry groups by the weights given in Lewis and Hussain [7]. User's prices were those implied by tariffs and producer prices were adjusted downward for domestic indirect taxes. Estimated implicit exchange rates are calculated from basic data as explained in the Appendix.

the manufacturing sector. Third, "investment and related goods" industries have had rising implicit exchange rates in the latter part of the period, and since their weight is larger in production by manufacturing than in purchases by agriculture, the behavior of the two weighted exchange rates is different. When viewed from either sector's point of view, however, the differences between the implicit exchange rates for agricultural and for manufactured goods were substantial in the mid-1950s, and, while the gap had narrowed considerably, it was still present in the 1960s. Finally, by the mid-1960s, the agricultural sector's implicit rate in East Pakistan, weighted by marketings, was the only implicit rate that was around the level of the official exchange rate. All other implicit rates were above the offical rate.

### III. *The Effects of Tax and Nontax Policy on Relative Prices*

The information on implicit exchange rates gives an opportunity to evaluate the relative effects of tax and nontax policy on prices over time. Table 2 and Figure 2 make a comparison for the three years (1954-55, 1959-60, and 1963-64) for which tariff and domestic tax rate data related to various industries were prepared.[12] From the tax data

[12] I am grateful to Ghulam Mohammad Radhu for extending his earlier study [15] to include 1963-64 and to estimate tax rates for some additional industries in the other two years.
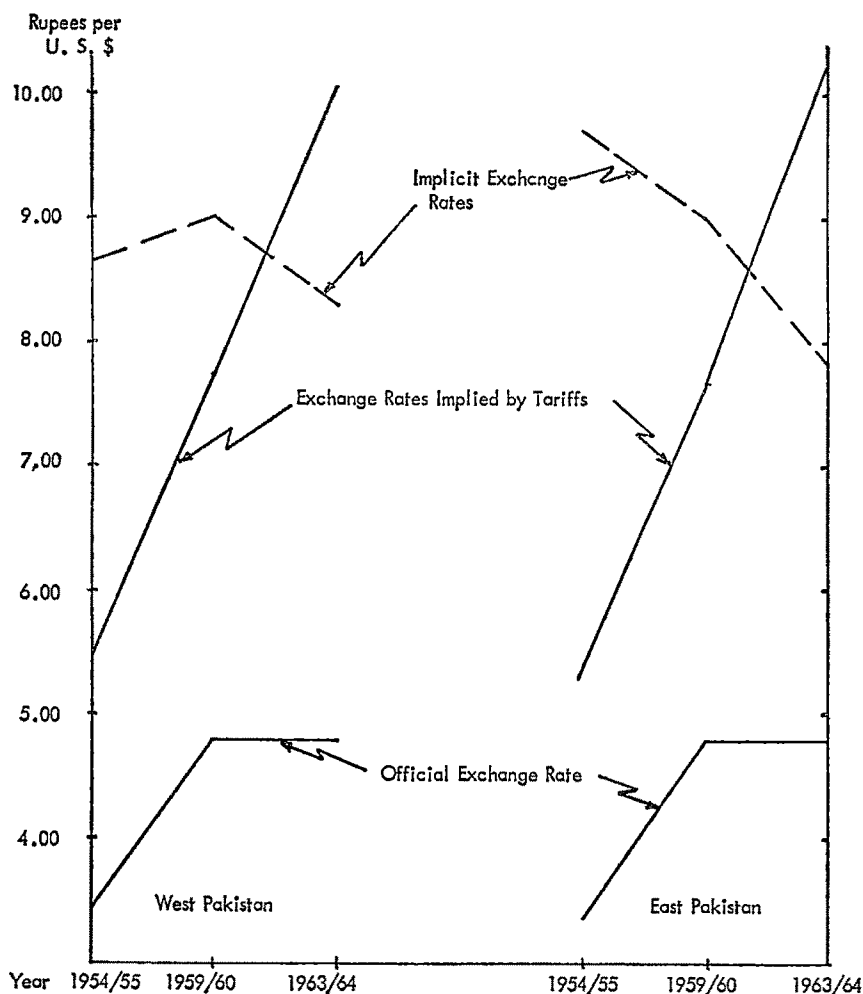
FIGURE 2. EXCHANGE RATES FOR MANUFACTURES PURCHASED BY FARMERS

and the official exchange rate, one can calculate an implicit exchange rate for each industry *if* domestic prices just equalled c.i.f. prices plus tariffs. The rates for each commodity group were weighted and averaged in the same manner as were the implicit rates for that year. Figure 2 gives the picture from the agricultural sector's point of view. If farmers had only been forced to pay the tariff-protected prices of goods in 1954-55, they could have purchased $1.00 of manufactures for Rs. 5.50, while it appears that they actually were forced to pay around Rs. 9.00 for these goods. The extent to which tariffs understated the true exchange rate for manufactures fell by 1959-60, and by 1963-64 the weighted average tariff on manufactured goods that farmers purchased

(Rs. 10.00) exceeded the implicit exchange rate for those goods (Rs. 8.00). The implicit exchange rate fell, even though both the tariffs and the official price of foreign exchange rose over the period 1954 to 1964. The same phenomenon appears from the viewpoint of the manufacturing sector, though there is less narrowing from 1954-55 to 1959-60 in the case of prices received by producers. Broadly speaking, tariffs understated the amount of protection that the manufacturing sector received during the early part of industrialization, but by the Second Plan period (1960-65) the weighted tariff had become redundant, the

TABLE 3—IMPLICIT EXCHANGE RATES AND TARIFF-IMPLIED EXCHANGE RATES
FOR MAJOR SUBSECTORS OF MANUFACTURING

|  | Rates Implied by Tariffs | | | Implicit Exchange Rates | | |
|---|---|---|---|---|---|---|
|  | 1954-55 | 1959-60 | 1963-64 | 1954-55 | 1959-60 | 1963-64 |
| East Pakistan Weighted by purchases of agricultural sector: |  |  |  |  |  |  |
| Consumption goods | 5.35 | 7.71 | 10.48 | 9.81 | 8.95 | 7.60 |
| Intermediate goods | 4.90 | 6.75 | 7.38 | 8.48 | 9.32 | 8.41 |
| Investment and related goods | 3.94 | 6.21 | 6.33 | 6.98 | 8.46 | 9.18 |
| West Pakistan Weighted by purchases of agricultural sector: |  |  |  |  |  |  |
| Consumption goods | 5.47 | 7.90 | 10.63 | 8.45 | 8.84 | 7.78 |
| Intermediate goods | 4.80 | 6.20 | 6.77 | 8.68 | 8.31 | 9.67 |
| Investment and related goods | 3.94 | 6.41 | 6.54 | 8.61 | 9.86 | 9.31 |

*Source:* Same method as followed in Table 2. Tariff rates from Radhu [15], implicit exchange rates from work sheets for this paper.

weighted average of actual prices was lower than weighted tariff protection. The most recent movement was due both to falling implicit exchange rates for goods and to rising tariffs on the same goods. Even in the First Plan period (1954-55 to 1959-60) the gap between tariffs and implicit exchange rates had narrowed from the extreme position that existed just after import controls were introduced.

    In order better to evaluate the movements in tariffs relative to those of implicit exchange rates, the manufacturing sector was divided into three groups used in earlier studies [7] [8] [19]: consumption goods, intermediate goods, and investment and related goods. The implicit exchange rates estimated from price data are compared with the exchange rates implied by tariffs in Table 3. Consumption goods indus-

tries had experienced a fall in prices relative to intermediate and investment goods, and by 1963-64 the tariffs on the consumption goods included here were on the average redundant. For intermediate and investment and related goods, where imports were still an important share of total supply, quantitative restrictions on imports dominated tariffs, and the estimated implicit exchange rates were above the average rates implied by tariffs. The implicit rate was below the tariff-implied rate for total manufacturing because of the heavy weight of domestic consumer goods industries in both total manufacturing production and domestic use of manufactures.

On balance, it would appear from the results here that nontax and nontariff policies have been more important than tariff and tax policies in setting relative prices over time. Such a conclusion is complementary to Pal's results [11] [12], where the evidence suggested that quantitative restrictions rather than costs or tariffs set prices of imports, at the margin. The present conclusion is even stronger. In a previously open economy, where trade is restricted and an overvalued currency is maintained, long-run considerations, or indirect tax and tariff policy, may have little or nothing to do with the whole structure of prices, whether of imported or of domestically produced goods. Such a conclusion was suggested by Radhu [16], with more scattered evidence related to price change and indirect tax changes. Radhu reported that there was no evidence that increased indirect taxes had resulted in higher prices, on the average. All this evidence is consistent with the view that most of Pakistan's industrial growth was a readjustment of the economy to the shocks of the 1952 trade crisis and the policies then adopted, and the disruption of the former customs union with British India.[13] On the average, the disequilibrium has worked itself off more in consumption goods than in intermediate and investment goods industries, though there are notable exceptions to any such general statement.[14] These results suggest, of course, that one cannot use tariff rates to estimate levels of protection and efficiency losses therefrom. The assumption that tariffs determine price differentials is used in a very provocative analysis by Soligo and Stern [19] of efficiency of resource allocation in Pakistan. It would appear that the assumption underlying such studies is incorrect.

[13] Rahman [17] is the most complete source on the break-up of the customs union. The argument is also spelled out in Lewis and Hussain [7].

[14] For example, jute textiles, paints and varnishes, sewing machines, fans, and some other electrical equipment are all exported from industries other than those producing consumer goods, indicating that they have met domestic demand and have exportable surpluses at competitive prices (when export bonus vouchers are taken into account). Sugar and artificial silk textiles are notable exceptions to the general phenomenon of falling implicit exchange rates for consumption goods.

IV. *Some Implications of the Implicit Exchange Rate Analysis*[15]
*Industrial Policy*

An important issue discussed in Pakistan in the mid-1960s was the import substitution process and the efficiency with which it had proceeded. One indictment of the pattern that allegedly was followed (i.e., emphasis on consumer goods industries) was offered by Power [14] and Khan [3]. Their argument was that import substitution in consumption goods industries had led to "consumption liberalization," or "decontrol" of consumption, when supply ceased to be subject to limitations imposed by import controls. Greater than "planned" increases in domestic consumption took place. Decontrol was reflected by falling prices of such goods relative to the wholesale price index. One result of the consumption liberalization, they argued, was the failure to meet the saving goal of the First Five Year Plan.[16] The results of this paper are relevant to their criticism.

Even before the trade crisis of the early 1950s, there were tariffs on manufactured consumer goods, and the currency was substantially overvalued. Domestic prices of manufactured goods were higher than "free trade" prices by at least the amount of the tariffs, and Pakistan had started on import substitution in many industries. The foreign exchange crisis, and the import licensing system that was adopted, exaggerated this price distortion even further, as is reflected in the implicit exchange rate movements from 1951-52 to 1954-55.[17] Many consumption goods industries, particularly, expanded rapidly and supplied virtually all of domestic supply of consumer goods by the mid-1950s, albeit at very high implicit exchange rates. As already stated, a number of industries moved toward international competitiveness through the late 1950s and even exported by 1950, though at an exchange rate more favorable, and more realistic, than the official rate. Domestic costs and implicit exchange rates continued to fall in the Second Plan period. Thus, there was a return toward the precrisis level of relative prices and implicit exchange rates as industrial growth responded to (i) the profitable price-cost situation and (ii) higher profits and investment rates due to favorable terms of trade. Though figures are not available, it is probably not an accident that saving rates rose as industrial growth of this type occurred.

[15] Some of this section draws heavily on my earlier article with Mushtaq Hussain dealing with domestic relative prices only [7]

[16] Consumption liberalization in the Khan sense is at best a partial explanation for the failure of saving rates to rise. The notions of analyzing actual consumption relative to a consumption level for each good implied in a plan is a useful one, however. Khan's findings probably tell us more about widening income inequalities than anything else.

[17] Even the three-year averages in the text tables show this movement. It is more sharply in evidence in the annual observations for 1951 to 1955.

The adverse movement in agriculture's terms of trade in the years after Partition, and particularly after the exchange crisis, taxed the agricultural sector heavily. The industrial response was substantial, however, and costs and prices in the new import substituting industries fell as capacity grew and efficiency progressed. One might conclude that the direction of industrial growth was in some sense efficient in the long run, since there was not a permanently higher level of prices of manufactured goods. Presumably, if protection results in a low volume of high-cost manufactures, it is not as successful as protection that results (with reasonable lags) in a higher volume of low-cost manufactures. The behavior of implicit exchange rates over the period of early industrialization in Pakistan suggests that a considerable amount of the short-run high costs of domestic production of importables had been eliminated by the early to mid-1960s, though there are still substantial price distortions in a number of industries.[18] The failure of relative prices and implicit exchange rates to readjust and to remove the disequilibrium between costs and prices would have been a matter of substantial concern. That is, if the relative price of manufactured goods, including consumption goods, had *not* fallen, there would have been an intolerably inefficient set of prices to direct resource allocation. A principal reason for the growth and import substitution in most of the consumer goods industries was not trade policy but rather the domestic production of raw materials used in consumer goods and simple technologies in most consumer goods industries. Tariff and import licensing policies, however, speeded the process substantially by transferring income to the profit-making, high-saving group in the economy, which responded quickly to improved incentives and higher incomes.

## Developments in East and West Pakistan

It has often been alleged that East Pakistan was squeezed for the benefit of industrial growth in West Pakistan, and that inter-wing trade (i.e., trade between East and West Pakistan) provided easy profits for businessmen in West Pakistan, while forcing East Pakistan to pay more for its manufactures than it would have if it could have traded freely with the rest of the world.[19] It is clear from the results in this

[18] On the matter of restraining consumption, indirect tax policy did drive a wedge between producer costs and wholesale prices, which may have aided in restraining consumption of some goods by diverting some production to exports. Whether indirect tax policy was used forcefully enough is a difficult question to answer in the absence of a good criterion. I have suggested elsewhere that it was not used adequately [5].

[19] Per capita incomes are higher in West Pakistan, and the gap widened considerably in the 1950s [4]. Though more than half the population lives in East Pakistan, that province had only about one-third of total value added in large-scale manufacturing industry [13] and only about one-third of the total fixed investment in the Second Plan period [10]. East Pakistan earned over half of total foreign exchange during the 1950s but received less than one-third of the value of imports into the country.

paper that the agricultural sectors in *both* provinces were placed at a disadvantage relative to the industrial sector in each, though agriculture in East Pakistan did have a worse decline in its terms of trade than did agriculture in the West wing.

The behavior of relative prices and implicit exchange rates in both provinces is fairly consistent with what is known about the development of inter-wing trade.[20] As trade grew after Partition, East Pakistan ran a trade surplus with the rest of the world and a trade deficit with West Pakistan.[21] A large portion of the imports into East Pakistan was manufactures produced in West Pakistan. This was in no small part due to (i) the importance of cotton textiles in total consumption of manufactures and (ii) substantial production of raw cotton in West Pakistan. It was also due in part to the fact that licenses for imports, investment permissions, and so forth, were given out by the Central government in Karachi, which is in the West wing. The reason for the more severe movement of prices in East Pakistan at the time of the trade crisis was that the domestic manufacturing capacity established by 1953, particularly in cotton textiles, had been located in West Pakistan. The sudden loss of imports into all Pakistan was felt more sharply in East than in West Pakistan. Once productive capacity in the West wing increased enough to provide adequate exports to the East (at the same time that there was some growth of capacity in the East wing as well) the relative position of East-wing agriculture improved considerably. Even in the mid-1960s, however, it was still somewhat worse off than West Pakistan agriculture, if the estimates here admit to such accuracy.

While East-wing agriculturalists were discriminated against more than their West-wing counterparts, the differences between the East- and the West-wing agricultural sector's terms of trade are small compared to the loss in the terms of trade that agriculture in *either* province suffered due to generally restricted trade. Given the overall policies adopted at the time of the trade crisis, and given the fact of Partition and its broader economic implications, agriculture would have been squeezed in both provinces. And, given that cotton textiles were the principal manufacturing commodity, and that raw cotton was produced in the West wing, there would presumably have been somewhat less severe price movements in the West wing than in the East even if the government had been scrupulously concerned with "parity" of industrial sanctions. Thus, while it is difficult to give a precise number, or quantitative estimate, to the extent to which government policy dis-

[20] The best source on the development of inter-wing trade is Rahman [17], and the discussion here draws on his results.

[21] Such a statement naturally becomes fuzzy when aid financed a substantial portion of total imports, but even the aid program left the East wing in deficit with the West wing.

criminated against East Pakistan, it is quite clear that only a part of the transfer from East Pakistan agriculture can be attributed to conscious discriminatory government policy on a provincial basis.

## V. *Conclusion*

In this paper a simple device, namely implicit exchange rates for tradable goods, has been used to examine the effects of economic policy on the difference between domestic and "free trade" relative price structures. The device can be applied easily in a country where relatively simple products are dominant in production and trade, and it gives a quantifiable indication of the impact of various policy instruments. The results for Pakistan give an indication of (i) the extent to which agriculture suffered and industrialists benefited from trade policy; (ii) the extent to which the economy worked off the disequilibrium of Partition and policies adopted at that time; (iii) the usefulness of the official exchange rate as a guide to the value of foreign exchange or of importable or exportable goods; (iv) further understanding of economic relations between East and West Pakistan; and (v) a crude picture of infant industries that were "growing up." In addition, on a more general level of interest the paper suggests that (i) a relatively simple device can be used to assess the impact of policies at any given time and to analyze the process of growth and policy change over time; (ii) when nonprice trade restrictions are important there need not be any correspondence between changes in tariffs or the exchange rate and changes in domestic prices of importables; and (iii) trade-restricting policies can have a substantial and measurable impact on the distribution of incomes in a country, particularly in transferring resources from the exporting to the import competing sectors.

APPENDIX: INTERNATIONAL PRICES AND IMPLICIT EXCHANGE RATES

The data on which the analysis in this paper is based are somewhat less reliable than those for domestic prices alone. Sources are different for agricultural and for manufactured goods, and are different among manufactured goods as well. A brief description of the sources and methods is given here.

Agricultural goods are more standardized and there is considerably more information on them than for manufactured goods. The basic sources for "world" prices of agricultural goods were the various issues of the FAO *Production Yearbook* and *Trade Yearbook*. Prices for major exporting countries or from major importing countries or commercial centers, in U.S. dollars, were obtained from those sources, and were adjusted for freight charges to obtain an f.o.b. price for potential exports or a c.i.f. price for potential imports from and to Pakistan, both for Karachi and Chittagong. Freight rates were obtained from shipping lines in Karachi. Because of the greater standardization and the fact that price data, not unit value data, were available, the movements of agri-

cultural prices are probably more reliable over time than those for manufactured goods.[22]

The implicit exchange rates for manufactured goods were estimated for the most part for 1964, and implicit rates for earlier years were estimated by projecting backward using the domestic price indices from Lewis and Hussain [7] and international price indices described below. The methods for estimating the implicit rate were of two basic types. One was based on direct price comparisons of the sort used for agricultural goods. The basic source for the direct price comparisons was the import price surveys reported by Pal [11], [12]. For any industry in which imports were a substantial proportion of total supply, the implicit rate for imports competing with that industry was used as the implicit exchange rate for the industry as a whole. The reasoning is that for those industries the price of competing imports determines the domestic market price for both imports and for domestic production. There are a few exceptions in some industries (sewing machines and kitchen utensils are exported from the machinery and from the metal products industries, for example) but when the great bulk of total supply was imported and/or competed directly with imports, the implicit exchange rate for imports was a good representation of the implicit exchange rate for the entire industry. Because of lower quality of domestic goods, however, the implicit exchange rate for imports may overstate the rate for domestically produced goods.

In the second group of industries (and the second method for calculating implicit exchange rates) where exports are a substantial part of total supply, and where the products in the industry are sufficiently homogeneous, the export price is a good representation of the ex-factory price of the goods the industry produces. Since the exchange rate (including bonus vouchers) at which the industry exports is known, if one assumes that the producers equate prices in the two markets, domestic and international, then the implicit exchange rate between producers' prices and world prices is given by the exchange rate for exports.[23]

Unfortunately, it was not possible to include in this study all the industries that were covered by domestic price data. Several industries, such as cigarettes, have none of total supply imported, but none is exported, so there is no opportunity to observe prices either of imports or of exports. Quality differences make direct price comparisons very difficult, if not impossible, in both cigarettes and such industries as beverages or printing and publishing. Such industries are omitted from the averages.[24]

[22] Agricultural commodities covered in the study were: coarse, medium, and fine rice, wheat, maize, barley, sorghum, pulses (lentils), potatoes, onions, oilseeds, cotton, jute, sugar (raw), tobacco, milk, butteroil, beef, mutton, wool, and hides and skins.

[23] If producers were less than perfect competitors domestically (which would be true for such things as paper), then they would not equate price but marginal revenue in the two markets, and the export rate would understate the implicit exchange rate. In view of the interest in the size of the difference between the rate for manufactures and for agricultural products, the fact that the method may have understated the exchange rates for some commodities, particularly cotton textiles, simply means that the differentials between world and domestic prices or terms of trade are greater than the estimates suggest. The differences for industries of fairly competitive market structure are not likely to be large, however.

[24] The manufacturing industries covered in the study were: ISIC No. 2092, 23, 24, 25, 27,

Indices of "international prices" for manufactures are, for the most part, unit values of exports of major exporting countries. Some industries were covered by price information given by the United Nations, and some were taken from the trade statistics published by the OECD. Several indices used were averages of two or three leading countries' price or unit value indices. For some industries the unit value indices of imports of the commodity group into Pakistan have been used. The major question was whether the movements in domestic prices that have been found in Lewis and Hussain [7] were due to or were reflections of the price movements in similar goods in international markets. If the economy was open and not controlled, the prices in both markets would move in the same directions. A great deal of precision, fortunately, was not necessary in the international prices, since if the unit value and price indices used are representative, they do not even move in the same direction as do the domestic prices. Even if one made the assumption that instead of moving in the opposite direction from domestic prices (as the price indices do) the international prices were simply constant, the results reported in this paper would remain the same, though there would be less convergence of the terms of trade of the two sectors in the mid-1950s than is estimated in the text. The direction of movement in international prices would have to be the opposite of what the figures suggest in order for the results of the paper to be offset to any considerable degree. It is unlikely that, on the average, the figures for international prices are biased to such an extent. The weights used are the same as those used by Lewis and Hussain [7] for domestic prices. The substantial variations in weighting for various estimates of sales and purchases by each sector do not result in very large differences in the behavior of the weighted implicit exchange rates for each sector.

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# THE UNION-NONUNION WAGE DIFFERENTIAL AND COST-PUSH INFLATION

## By Adrian W. Throop*

Econometric studies have indicated that money wages in manufacturing during the 1950s rose faster than labor productivity, at full employment.[1] This might be explained by inflationary expectations arising from the demand inflation of the 1940s. But it might also be explained by one of two general types of cost inflation models.

In the first model nonunion wages are determined by competitive market forces; and the primary impact of labor unionism is on the structure, not the general level, of money wages.[2] This model predicts that a cost-push inflation would be temporary since unions would eventually be able to obtain an equilibrium relative wage advantage for their members. As the differential between union and nonunion wages ceased to widen, cost-push inflation would come to an end.

In the second model union wage gains are transmitted in one way or another to nonunion workers.[3] Firms employing unorganized labor may be induced to match changes in union wage rates in an attempt to prevent the unionization of their own employees; or they may do so simply because nonunion workers might become less productive if wage differentials unfavorable to them were allowed to develop. It has been alleged that such transmission of union wage gains has become institutionalized in the U.S. economy in the form of the so-called "key group" wage pattern. This wage pattern is known to affect union wage rates in durable goods industries. But it is also supposed to "spill over" to nonunion labor, as well as to other union labor, and thereby to influence significantly the general level of money wages.[4] Because of a transmission of union wage increases to nonunion workers, the second model predicts that unions would never be able to reach an equilibrium. Permanent inflation or price stability at the cost of unemployment would result.

This paper presents evidence in support of the hypothesis that union pressure on wages was the source of a once and for all cost-push inflation

[1] See, for example, Perry [15].

[2] A succinct statement of this view may be found in Rees [18 Chs. 4-5].

[3] See, for example, Slichter [23].

[4] See Eckstein and Wilson [3], Fellner, Gilbert, Hansen, Kahn, Lutz, and de Wolff [4], Hickman [7], and Maher [12].

in the 1950s. A direct examination of the hypothesis of a wage pattern set by a key group lies outside its scope, but serious doubt is raised as to the significance of wage spillover.[5] In Section I, a method of measuring the percentage wage differential between union labor and nonunion labor is discussed. Section II uses this method to measure variation during the 1950s in the differential between union and nonunion wages. A significant increase is found, and the causes of union disequilibrium are explained. In Section III, it is shown that growth in the union-nonunion wage differential had ceased by the late fifties, and the effect which this differential's widening had on the Phillips curve of the 1950s is estimated. Section IV provides a brief summary and some conclusions about the role of labor unions in the postwar inflation.

## I. *Unionism and the Interindustry Wage Structure*

### A. *Determinants of the Equilibrium Union-Nonunion Wage Differential*

The equilibrium relative wage advantage which a union obtains for its members depends upon the union's potential power (i.e., the cost to the union in the form of lost employment opportunities of a higher wage rate), its bargaining power (i e., the ability to make the employer accept a specified wage rate), and its wage policy. The union's potential power varies with the elasticity of derived demand for union labor. The union's bargaining power may be defined in terms of the expected loss in earnings from strikes anticipated to be necessary to obtain and maintain a specified wage rate. The lower this expected loss, the greater the bargaining power of the union. The economic choices confronting the union may then be expressed by a function equal to the derived demand price for union labor (at each level of employment) less the expected strike losses per man-hour necessary to obtain and maintain a wage rate equal to that demand price. This is denoted as the net derived demand schedule. Let the union's wage policy be described by a preference map specifying equally desirable combinations of net wage rates and employments. The union would then bargain for a higher wage rate whenever the slope (in absolute value) of the net derived demand schedule exceeded the union's marginal rate of substitution of employment for the net wage.

The degree of union organization within meaningfully defined industries appears to be an important determinant of both the potential power and the bargaining power of a union. But the census industries utilized in the present study are not industries in an economic sense since they do not comprise a group of firms producing close substitutes. For instance, a two-digit manufacturing industry such as food products

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[5] For specific studies of "key group" wage behavior which reach similar conclusions, the interested reader may wish to consult Ross [20], Snodgrass [24], and Throop [26, Ch. 5].

contains meat products, dairy products, canned food, grain mill products, bakery goods, sugar, confectionary and related products, and beverages. Therefore, it would be incorrect to assume that the average elasticity of net derived demand for union labor necessarily varies positively with the degree of unionization of a census industry. The relative wage of census industries would nevertheless vary with the degree of unionization of census industries simply because of the arithmetic dependence of a weighted mean upon its weights. Assuming that unions generally obtain some positive wage advantage for their members, the higher the proportion of workers covered by a union contract the higher would be the relative average earnings of labor in the census industry, net of skill differences.

## B. *Measurement of the Union-Nonunion Wage Differential*

Earlier studies of the relationship between unionism and variations in the interindustry wage structure during the postwar period have produced less than firm conclusions because the influence of movements in the quality of industry skill mixes and the effects of changes in occupational wage differentials have been largely ignored.[6] In this paper, an attempt has been made to allow for these effects before testing for the possible influence of unionism. For this purpose, an index of industry skill level, which varies with changes in the quality of the skill mix of an industry's work force *and* with variations in median occupational earnings, was constructed for each census industry in the sample. It is calculated for any industry by weighting current median annual sex-occupational earnings throughout the economy by the current relative industry employments of corresponding sex-occupational groups.[7]

The following model is used to estimate the influence of unionism on the interindustry wage structure and to determine if union-induced changes in the wage structure could have been responsible for the inflationary bias indicated by the postwar Phillips curve.

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[6] The main studies on the 1950s include Bowen [1], Levinson [9], McCaffree [14], Segal [22], and Snodgrass [24]. All but Levinson's show an increasing differential between the wages of union and nonunion workers. The relationship is never more than marginally significant. However, none of the studies net out the influence of variation in industry skill mixes or changes in occupational wage differentials. The index of skill level discussed in the text should allow this to be done.

[7] In symbols, the index of skill level is defined as

$$S = \sum_{i=1}^{n} \frac{a_i}{E} w_i,$$

where $a_i$ is the number of workers of a given sex and occupation employed by the industry, $w_i$ is the median annual earnings of workers in each sex-occupational classification throughout the economy, and $E$ is the total number of production or nonsupervisory workers employed in the industry.

(1a)
$$\frac{W}{S^{B_0}} m = 1 + B_1 U + B_2 CS,[8]$$

where

$W$ = average hourly earnings of production or nonsupervisory workers in a census industry,

$S$ = the index of skill level for production or nonsupervisory workers in a census industry,

$m$ = a correction factor required because $W$ and $S$ are measured in different units,

$U$ = the proportion of a census industry's production or nonsupervisory workers that is covered by collective bargaining agreements,

$CS$ = index of city size. This is the proportion of a census industry's production or nonsupervisory workers that is employed in the nation's fifty largest cities.

Further, for reasonable values of $B_1$ and $B_2$,[9]

(1b)
$$\ln \frac{W}{S^{B_0}} m \approx B_1 U + B_2 CS,$$

or

(1c)
$$\ln W \approx - \ln m + B_0 \ln S + B_1 U + B_2 CS;$$

and

(1d)
$$\frac{\Delta W}{W} \approx - \frac{\Delta m}{m} + B_0 \frac{\Delta S}{S} + \Delta B_1 U + \Delta B_2 CS.[10]$$

The index of city size ($CS$) is included as an explanatory variable in order to account more fully for differences in skill level among industries. Recall that the index of skill level is obtained for any industry by summing, over all sex-occupational groups, relative industry employment times the group's median annual earnings throughout the economy. Variations in the level of earnings within the same sex-occupational group are known to be associated with the size of cities in which workers

[8] If $S$ were a perfect measure of skill level, $B_0$ should be constrained to a value of one by regressing $W/S$ on the degree of unionization; and of course the city size variable would be unnecessary. Since $S$ is in fact an imperfect measure and in order to make it less likely that the estimate of $B_1$ is influenced by unmeasured differences in skill, $B_0$ was not so constrained.

[9] Ln of the quantity one plus a fraction is approximately equal to the fraction itself.

[10] Constancy of $B_0$, $U$, and $CS$ is assumed here. The $U$ and $CS$ data are for 1958 only, but there is not likely to have been much variation in either $U$ or $CS$ over the decade of the 1950s. If $B_0$ were to vary, this equation should include the additional term $\Delta B_0 \ln S$. This expanded equation was estimated on the first attempt; however, the regression coefficient of $\ln S$ turned out to be smaller than its standard error. Therefore, $\ln S$ was dropped from the final estimated equations.

are located.[11] Consequently, the index of city size performs the function of removing some of the variation in industry average earnings which is associated with intra-occupational wage differentials.

If the average extent of unionism in organized subindustries were uncorrelated with the degree of unionization of census industries, a least squares estimate of $B_1$ would be uninfluenced by variations in union power due to differences in the extent of union organization at the subindustry level. It would therefore be an unbiased measure of the average percentage wage differential between union labor and nonunion labor of comparable skill. On the other hand, to the extent that the degree of unionization in the average organized subindustry is positively correlated with the degree of unionization in the census industry, variations in union power would be systematically associated with the differences in $U$; and a least squares estimate of $B_1$ would tend to overstate this union-nonunion wage differential.

The extent of unionism in organized subindustries, and hence union power in those industries, does in fact appear to vary positively with the degree of unionization in census industries. The cost of organizing and maintaining union membership may prevent a union from organizing an entire subindustry, even though such a move would help to maximize both potential power and bargaining power. This is apt to be less true in concentrated subindustries, however. Given the present legal framework of industrial relations, concentrated industries offer a more favorable environment for union organizers. Concentrated industries normally are characterized by relatively large establishments; and, in terms of financial and organizational effort spent per potential union member, large plants are easier to organize than small ones. Barriers to entry, which are in part responsible for high concentration, also assure that union organization will not be exposed to a danger of entry by new, and thus nonunionized, firms. For these reasons concentrated industries tend to be more fully organized than nonconcentrated ones.[12] It is therefore significant that census industries with high degrees of unionization generally have a high proportion of concentrated subindustries.[13]

[11] See Mansfield [13] and the references therein. The city size wage differential partly reflects the general urban-rural wage differential which is associated with a migration to urban areas. It also derives from the fact that the most highly specialized, and therefore best paid work, is done in larger cities. Then too, the cost of living tends to vary positively with city size.

Preliminary tests indicated that the use of additional variables relating to race, region, and establishment size did not help to explain intra-occupational wage variation. These findings parallel those of Fuchs [8, pp. 27–31] who has demonstrated that the North-South wage differential can be fully explained by regional differences in labor force mix, city size, and the extent of unionization.

[12] These relationships are discussed at length in Segal [21].

[13] Regressing the degree of unionization of two-digit manufacturing industries on the proportion of subindustries which is concentrated, the coefficient of multiple determination is .423. This gives a significant F value. The sources of these data are Douty [2] and Levinson [9].

This suggests that the average extent of union organization in sub-industries, hence average union power, is probably positively correlated with the degree of unionization in census industries. Consequently, a least squares estimate of $B_1$ from a sample of census industries is likely to overstate the true union-nonunion wage differential.

The Bureau of Labor Statistics' 1958 estimates of union contract coverage[14] were used to estimate the value of $B_1$ in 1950 and 1960. During the 1950s the distribution of union membership among sample industries did not change appreciably. The distribution of union membership in 1940 was significantly different from that of the 1950s, however; and to the author's knowledge, no unionization data in equal detail are available for 1940 or approximate years. Consequently, it was not possible to estimate the model's parameters for 1940.

Estimates of the model for 1950 and 1960 appear in Table 1. The regression coefficients of the index of skill level and the degree of unionization are both significantly different from zero at acceptable confidence levels. City size has a marginally significant influence on industry earnings. As is indicated by the increases due to unionism in the coefficients of multiple determination, unionism accounts for a relatively small proportion of inter-industry differences in average earnings.[15]

Our estimated values of the union-nonunion wage differential are .223 for 1950 and .260 for 1960. These figures exceed H. Gregg Lewis' estimates of the differential for corresponding years [11, Table 64]. This is not surprising since a positive correlation between average union power and the degree of unionization in census industries would tend to make the estimated value of $B_1$ overstate the relative wage advantage of the average union member. Lewis' estimates are likely to be biased upward due to an incomplete adjustment for differences in labor quality,[16] and the estimates presented here appear to be biased upward for the same reason. This is suggested by the fact that the present estimates also exceed those of Leonard Weiss [27], who was able to adjust rather completely for differences in skill by making use of the 1/1000 sample of the 1960 Census of the Population.[17]

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[14] The data for two-digit manufacturing industries were taken directly from Douty [2]. Comparable degree of unionization data for wholesale and retail trade, and mining industries, and contract construction was derived from Lewis [11, Table 74 and 76].

[15] Using different procedures, Lewis arrived at a similar conclusion in [10] and [11, Ch. 9].

[16] See Reder [17].

[17] Weiss compared earnings of particular occupations across industries with differing degrees of unionization, and allowance was made for the effects of certain personal characteristics on wages. Weiss estimated that operatives' earnings rise by 6–8 per cent with an increase of a three-digit industry's degree of unionization from 50 to 90 per cent. If one were willing to extrapolate this figure, it would appear that the average relative wage advantage of union members during 1959 was on the order of 15 per cent. Because of deficiencies in sampling, this

TABLE 1—LN OF AVERAGE HOURLY EARNINGS ($W$) REGRESSED ON LN OF INDEX OF SKILL LEVEL ($S$), DEGREE OF UNIONIZATION ($U$), AND INDEX OF CITY SIZE ($CS$)

Bituminous Coal Mining, Contract Construction, Crude Petroleum and Natural Gas Fields, Metal Mining, Quarrying and Nonmetallic Mining, Retail Trade, Wholesale Trade, and Two-Digit Manufacturing Industries

1950

$\bar{R}^2 = .615$   $\ln W = -4.45 + 1.21 \ln S$
(.192)**

$\bar{R}^2 = .715$   $\ln W = -3.67 + 1.09 \ln S + .234\ U$
(.169)**   (.0775)**

$\bar{R}^2 = .624$   $\ln W = -4.44 + 1.20 \ln S + .156\ CS$
(.190)**   (.125)

$\bar{R}^2 = .716$   $\ln W = -3.72 + 1.09 \ln S + .113\ CS + .223\ U$
(.169)**   (.111)   (.0781)**

1960

$\bar{R}^2 = .728$   $\ln W = -5.82 + 1.36 \ln S$
(.169)**

$\bar{R}^2 = .820$   $\ln W = -4.82 + 1.21 \ln S + .278\ U$
(.142)**   (.0778)**

$\bar{R}^2 = .753$   $\ln W = -5.99 + 1.36 \ln S + .227\ CS$
(.160)**   (.127)*

$\bar{R}^2 = .833$   $\ln W = -5.02 + 1.23 \ln S + .172\ CS + .260\ U$
(.137)**   (.105)   (.0759)**

*Note:* Throughout this paper ** signifies that the regression coefficient is significantly different from zero at a 99 per cent confidence level on the basis of a single-tailed $t$ test. * denotes significance at a 95 per cent confidence level.

*Sources:* Average hourly earnings [33]; Index of skill level [28] [29] [30] [31]; Index of city size [32]; Degree of unionization [2] [11, Tables 74 and 76].

It is not unlikely that industries employing a high proportion of the better-paid occupations also employ relatively skilled workers from the low-paid occupations. If there is such complementarity in the demand for labor, the index of skill level would tend to understate the skill level of high-wage industries and overstate the skill level of low-wage industries. Since the degree of unionization is positively correlated with skill, such unmeasured differences in skill would also tend to raise the estimated value of $B_1$.[18] Although the present estimates of the

estimate probably tends to understate the degree to which occupational earnings vary with unionism. Intercorrelation between average union power and the degree of unionization in census industries is likely to have the opposite effect, however.

[18] Unionism would increase the average quality of labor hired within each occupational group if unions are not able to fully prevent employers from raising their hiring standards in

average relative wage effect of unionism appear to be biased upward due to such a positive correlation between the degree of unionization and an unmeasured component of labor quality, as well as because of the previously mentioned association between average union power and the degree of unionization in census industries, an estimate of the change in the average relative wage effect of unionism between census dates perhaps can be made with a greater degree of confidence. This would be true if unmeasured changes in industry skill levels were correlated with measured changes to a greater degree than is true of unmeasured and measured skill levels at a point in time.

## II. *Variation in the Union-Nonunion Wage Differential*

### A. *Adjustment for Labor Supply Effects*

The estimates of the previous section show only a small increase in the union-nonunion wage differential between 1950 and 1960. These estimates may understate the true increase, however, because the greatest increases in employment occurred in wholesale and retail trade, where the degree of unionization is almost zero. The effects of labor supply on wages must be allowed for explicitly. This is done by estimating the wage structure model in its percentage change form and by including an additional variable to allow for the effects of differential rates of growth in employment.

To measure the effects on wages of differential employment growth, an index of labor supply was constructed. Differences in the growth of employment among unionized workers need not cause any noticeable variation in the rate of change of union wages since union wage rates ordinarily should exceed the supply price of labor. In the case of nonunion workers, however, the rate of change of wages is influenced by the rate of change of nonunion employment and the elasticity of nonunion labor supply to the industry. The elasticity of nonunion labor supply in a general equilibrium context is defined as the ratio of the percentage change in relative nonunion employment to the percentage change in the nonunion relative wage. It may be written as

$$(2a) \qquad E_{ls} = \frac{\Delta\left[\dfrac{E(1-U)}{E_t(1-U')}\right]}{\dfrac{E(1-U)}{E_t(1-U')}} \Bigg/ \frac{\Delta\left[\dfrac{W_{nu}}{\overline{W}_{nu}}\right]}{\dfrac{W_{nu}}{\overline{W}_{nu}}}$$

order to reduce the impact of higher wage rates on cost. This effect could also contribute to a positive correlation between unmeasured skill and the degree of unionization, tending to raise further the estimated value of $B_1$. On the other hand, since unions obtain nonpecuniary, as well as pecuniary, benefits for their members, the omission of nonpecuniary benefits from our analysis leads to an understatement of the true relative wage effect of unionism. The net influence of these two additional biases is not clear.

where

$E$ = employment in a census industry,

$U$ = degree of unionization in a census industry,

$E_t$ = total labor force,

$U'$ = degree of unionization in the economy,

$W_{nu}$ = average wage of nonunion workers in a census industry,

$\overline{W}_{nu}$ = average wage of nonunion workers of comparable skill in the economy.

If the degrees of unionization remain invariant, this reduces to

$$(2b) \qquad E_{ls} = \frac{\dfrac{\Delta E}{E} - \dfrac{\Delta E_t}{E_t}}{\dfrac{\Delta W_{nu}}{W_{nu}} - \dfrac{\Delta \overline{W}_{nu}}{\overline{W}_{nu}}}$$

Rearranging terms, the percentage change in the nonunion average wage of a census industry is

$$(3a) \qquad \frac{\Delta W_{nu}}{W_{nu}} = \frac{\Delta \overline{W}_{nu}}{\overline{W}_{nu}} + \frac{1}{E_{ls}}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right].$$

Substituting for $\Delta \overline{W}_{nu}/\overline{W}_{nu}$ in terms of the index of skill level and the index of city size,

$$(3b) \qquad \frac{\Delta W_{nu}}{W_{nu}} \approx -\frac{\Delta m}{m} + B_0 \frac{\Delta S}{S} + \Delta B_2 CS + \frac{1}{E_{ls}}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right]$$

Assume that union wage rates generally exceed the supply price of labor so that employment effects on union wages are negligibly small.[19] The percentage change in the average union wage of a census industry is then equal to

$$(4) \qquad \frac{\Delta W_u}{W_u} \approx -\frac{\Delta m}{m} + B_0 \frac{\Delta S}{S} + \Delta B_1 + \Delta B_2 CS.$$

Consequently, the percentage change in the industry's average wage is

$$(5) \qquad \frac{\Delta W}{W} \approx -\frac{\Delta m}{m} + B_0 \frac{\Delta S}{S} + \Delta B_1 U + \Delta B_2 CS$$
$$+ (1 - U)\frac{1}{E_{ls}}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right].$$

An important and easily measured determinant of the elasticity of supply of nonunion labor ($E_{es}$) is the size of the industry's nonunion

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[19] For the effect of making an alternative assumption, see footnote 20.

labor force relative to total nonunion employment. When the industry's nonunion work force as a proportion of the total is extremely small, the elasticity of supply approaches infinity. This proportion therefore was used as a proxy for $1/E_{ls}$.[20]

The wage structure model in percentage change form is estimated for the 1950s in Table 2. When no allowance is made for the effects of nonunion labor supply, the estimated increase in the union-nonunion wage differential is about 5 percentage points, or roughly the same as that obtained from the point-in-time model. The effects of nonunion labor supply have a statistically significant influence, however. When these are taken into account, the increase in the union-nonunion wage differ-

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[20] Preliminary tests indicated that simply the rate of change of employment is of no explanatory value. Differences in the elasticity of labor supply need to be taken into account. If the elasticity of labor supply $(E_{ls})$ were known for each industry, the regression coefficient for the term

$$(1 - U)\frac{1}{E_{ls}}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right]$$

should turn out to be insignificantly different from one. But since a proxy variable had to be used for $E_{ls}$, no particular value can in fact be anticipated.

When the size of the industry's nonunion work force as a proportion of total nonunion employment is substituted for $E_{ls}$, the above expression becomes

$$\frac{(1 - U)^2}{(1 - U')}\frac{E}{E_t}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right].$$

The factor $1/(1-U')$ was eliminated since it does not vary among industries, and the remaining quantity was multiplied by one hundred to make the resulting index of labor supply $(LS)$ the same order of magnitude as the other variables. This index of labor supply appears in the regressions throughout the remaining tables. The total employment of production and nonsupervisory workers in the sample was used for $E_t$. This is preferable to using total nonagricultural employees since the latter includes occupations which are noncompetitive with production and nonsupervisory workers.

Since a positive union-nonunion wage differential has been estimated, it seems reasonable to assume that union wage rates generally exceed the supply price of labor. Some union wages undoubtedly do not exceed labor's supply price, however; and it would be helpful to know how sensitive the estimated change in the union-nonunion wage differential is to this particular assumption. Making the alternative assumption that union wages never exceed labor's supply price, the change in the industry wage becomes

$$\frac{\Delta W}{W} \simeq -\frac{\Delta m}{m} + B_0\frac{\Delta S}{S} + \Delta B_1 U + \Delta B_2 CS + \frac{1}{E_{ls}}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right].$$

Substituting $E/E_t$ as the proxy for $1/E_{ls}$ the alternative index of labor supply $(LS')$ is

$$\frac{E}{E_t}\left[\frac{\Delta E}{E} - \frac{\Delta E_t}{E_t}\right]100.$$

Estimates on the basis of this index are set forth in Table 2. The estimated value of $\Delta B_1$ now falls to .092, and the corrected $R^2$ is lowered only slightly when the alternative index is used. The corrected $R^2$'s of the two specifications are almost identical when wage changes are measured in cents-per-hour terms. It is impossible on purely statistical grounds to choose between these two indexes of labor supply; but the best estimate of $\Delta B_1$ would seem to lie between .092 and .129, and probably nearer the latter figure than the former.

TABLE 2—PERCENTAGE CHANGE ($\dot{W}$) AND CENTS PER HOUR CHANGE ($\Delta W$) IN AVERAGE
HOURLY EARNINGS REGRESSED ON PERCENTAGE CHANGE ($\dot{S}$) AND ABSOLUTE CHANGE ($\Delta S$)
IN INDEX OF SKILL LEVEL, DEGREE OF UNIONIZATION ($U$), INDEX OF
CITY SIZE ($CS$), AND INDEX OF LABOR SUPPLY ($LS$)

Bituminous Coal Mining, Contract Construction, Crude Petroleum and Natural Gas Fields,
Metal Mining, Quarrying and Nonmetallic Mining, Retail Trade, Wholesale Trade, and
Two-digit Manufacturing Industries

1950–60

$\bar{R}^2 = .493$  $\dot{W} = -.548 + 1.61\ \dot{S} + .0521U + .106\ CS$
  $(.381)^{**}\ (.0744)\ (.101)$

$\bar{R}^2 = .708$  $\dot{W} = -.719 + 1.85\ \dot{S} + .127\ U + .00663\ CS + .127\ LS$
  $(.295)^{**}\ (.0595)^{*}\ (.0805)\ \ \ \ (.0314)^{**}$

$\bar{R}^2 = .721$  $\dot{W} = -.714 + 1.85\ \dot{S} + .129\ U + .128\ LS$
  $(.281)^{**}\ (.0549)^{*}\ (.0292)^{**}$

$\bar{R}^2 = .702$  $\dot{W} = -.634 + 1.76\ \dot{S} + .0920\ U + .0660\ LS'$
  $(.286)^{**}\ (.0554)^{*}\ (.0163)^{**}$

$\bar{R}^2 = .874$  $\Delta W = -59.6 + .0739\ \Delta S + 39.8\ U + .0386\ W \cdot CS + .150\ W \cdot LS$
  $(.00736)^{**}\ (8.52)^{**}\ (.0671)\ \ \ \ (.0391)^{**}$

$\bar{R}^2 = .880$  $\Delta W = -59.6 + .0740\ \Delta S + 40.0\ U + .151\ W \cdot LS$
  $(.00714)^{**}\ (7.83)^{**}\ (.0359)^{**}$

$\bar{R}^2 = .881$  $\Delta W = -51.1 + .0709\ \Delta S + 34.1\ U + .0734\ W \cdot LS'$
  $(.00709)^{**}\ (7.44)^{**}\ (.0172)^{**}$

*Sources:* Average hourly earnings [33]; Index of skill level [28] [29] [30] [31]; Index of
city size [32]; Degree of unionization [2] [11, Tables 74 and 76]; Index of labor supply [2]
[11, Tables 74 and 76] [33].

ential is estimated at 12.9 percentage points; and this increase is
significantly different from zero at an acceptable confidence level. Un-
measured changes in skill level appear to be more highly correlated
with measured changes than with unionism. This is suggested by a re-
gression coefficient for the percentage change in the index of skill level
which is very much higher than the value of $B_0$ estimated from point-in-
time data. Therefore, it is unlikely that any very large amount of the
estimated increase in the union-nonunion wage differential is due to an
intercorrelation between unionism and unmeasured changes in skill
level.

A further consideration also makes it improbable that the estimated
increase in union-nonunion wage differential is spurious. The existence
of a wage pattern during the fifties among union wage rates in durable
goods industries has been documented in recent studies.[21] This pattern
tended to produce conformity in cents-per-hour wage rate increases.

[21] See Maher [12], Ross [20], Snodgrass [24], and Throop [26, Ch. 5].

The census industries involved in this union wage pattern make up the bulk of industries in the present sample with relatively high degrees of unionization. Because of this wage pattern, the degree of unionization should be more closely related to cents-per-hour increases in earnings than to percentage changes. When cents-per-hour changes are regressed on the absolute change in the index of skill level, the degree of unionization, and appropriately modified city size and labor supply indexes, there is a substantial reduction in unexplained variance over the percentage change model; and the value of the unionization regression coefficient is increased to over four times its standard error. Thus, the importance of this wage pattern is confirmed by a different procedure, and the high statistical significance of the unionism parameter makes it unlikely that unionism functions only as a proxy for unmeasured changes in skill level.

B. *An Explanation of the Increase in the Union-Nonunion Wage Differential*

Earlier it was shown that there is an equilibrium relative wage for union members which depends upon the potential power and bargaining power of unions. Given the distribution of union membership in the economy, it follows that there is some equilibrium relative wage for the average union member. For the relative wage of the average union member to have increased during the 1950s, unions must have been in disequilibrium. There is good reason to believe that first wage controls and then demand inflation, in the 1940s, operated to put unions in such disequilibrium.

Between 1939 and 1953, union membership relative to the total employment of production workers roughly doubled in manufacturing.[22] Union membership in the remainder of the economy increased significantly too. This general growth in union organization seems to have been completed by 1945.[23] The rapid growth of union membership did not have any immediate significant impact on industry wage differentials because of the effective wage controls of the War Labor Board. AFL and CIO leaders agreed to forego strikes and abide by the orders of the War Labor Board for the duration of the war. The inter-industry wage structure was not completely frozen by the War Labor Board, but most variation seems to have been in response to competitive market pressures, particularly to the short supply of unskilled workers.

The marked growth of union membership during wartime wage controls must have reduced the union-nonunion wage differential since the wages of new union members would have been kept at competitive

[22] See Lewis [11, Table 74].
[23] See Lewis [11, p. 7].

levels. A subsequent adjustment of industry differentials is likely to
have been postponed until the 1950s by the relative rigidity of union
wages during a large and unexpected demand inflation.[24] The collective
bargaining process is likely to be disadvantageous to union members
during rapid inflation, but advantageous to them during deflationary
periods. Because of the costs of negotiating any more frequently, collec-
tive bargaining agreements typically run for at least a year. In a period
of unanticipated demand inflation, relative wages of union members
would tend to fall because nonunion wages can be adjusted more fre-
quently. At the same time, management may be more reluctant to
grant increases of money wages to organized workers than to unorgan-
ized ones because unions make it more difficult to rescind such increases
should the increase in the price level prove to be only temporary. More-
over, organized workers are not likely to attempt to recoup their rela-
tive losses until they are sure that the decline in their relative wages
would otherwise be permanent.

The rigidity of union wages during the demand inflation of the late
forties would have postponed the ultimate adjustment of industry wage
differentials to the new pattern of unionism. Furthermore, it is likely
that the rigidity of union wages caused the union-nonunion wage differ-
ential to decline even further, thereby adding to the initial union dis-
equilibrium. But it does not seem possible to determine whether this is
so since the problem of measurement is formidable. The lack of appro-
priate data on unionization for 1940 is an initial handicap, but the
distribution of unionism among industries at the time wage controls
were relaxed appears to have been substantially the same as in the
1950s. Consequently, if rigidity of union wages did reduce the union-
nonunion wage differential further, industry wage changes in the forties
should be inversely related to 1958 degrees of unionization. An estima-
tion of the model for wage changes in the forties was attempted, but the
results were inconclusive. The regression coefficient for 1958 degrees of
unionization was only insignificantly negative. More importantly,
changes in wages due to nonunion market forces were not explained well
by changes in the index of skill level. The substantial unemployment at
the beginning of the forties, which probably affected industry wages
quite nonuniformly, appears to be the underlying reason for this.

Since the effect of the rigidity of union wages on wage differentials
during the forties should not have been large relative to that of market
forces, an inability to measure the latter accurately precludes a precise
assessment of the strength of union-wage rigidity in this period. Even
though it is not possible to evaluate the relative importance of wage

[24] A general discussion of the rigidity of union wages appears in Friedman [6]. For a case
study, see Rees [19, Ch. 5]. Evidence of its effect historically is examined in Lewis [11, Chs. 5–6].

controls and the rigidity of union wages in creating what appears to have been a disequilibrium union-nonunion wage differential, the hypothesis of union disequilibrium can be accepted as reasonable on theoretical grounds. It is doubtful, furthermore, that the measured increase in the union-nonunion wage differential during the fifties can be explained by an alternative hypothesis. Several have been suggested; but none has yet been tested against the union disequilibrium hypothesis, with proper allowance for the influence of changes in skill level.

## C. *Alternative Hypotheses*

William Bowen [1] has suggested that differences in industry wage behavior during the 1950s can be most readily explained in terms of three variables—the level of industry profits, the degree of unionization, and the degree of concentration in product markets. In Table 3, results close to Bowen's are obtained for the period 1950–60. With no allowance for the rate of change of skill level, the profit variable is statistically significant. The regression coefficient for the degree of unionization is larger than its standard error, but not significantly so. Concentration has a statistically insignificant influence for the full decade in contrast to the positive influence observed by Bowen in certain subperiods. But when the rate of change of the index of skill level is introduced, only the coefficient of the degree of unionization exceeds its standard error.

An explanation of Bowen's findings, and by implication our own, has been offered by Melvin Reder [16, pp. 293–6]. A relatively high rate of increase of union money wages during the decade of the fifties may have been due to a differential response of employers to postwar excess demand. Industries with high capital-output ratios and relatively long-lived productive capacity (roughly durables compared to nondurables) might be expected to have expanded in response to excess demand more cautiously than others. Thus, less of an immediate need for wage increases might have been anticipated than in other industries. But the strength of product prices in these industries would have tended to last longer than elsewhere, thus facilitating the subsequent payment of relatively large wage increases in order to make up for the previous (relative) loss.

Another hypothesis advanced by Reder emphasizes the possible effect of differences in employer policies with respect to labor turnover [17, pp. 193–94]. Because the hiring and training of skilled workers requires a greater investment cost per man than for unskilled workers, employers of skilled workers have a greater incentive to keep labor turnover low. That is, such employers tend to be less responsive to transitory changes in labor demand. The implication is that employers in industries with more highly skilled labor would have tended to re-

TABLE 3—PERCENTAGE CHANGE ($\dot{W}$) AND CENTS PER HOUR CHANGE ($\Delta W$) IN AVERAGE HOURLY EARNINGS REGRESSED ON INDEX OF LABOR SUPPLY ($LS$), DEGREE OF UNIONIZATION ($U$), DEGREE OF CONCENTRATION IN PRODUCT MARKETS ($C$), AFTER TAX RATE OF RETURN ON EQUITY ($P$), PERCENTAGE CHANGE ($\dot{S}$) AND ABSOLUTE CHANGE ($\Delta S$) IN INDEX OF SKILL LEVEL, INDEX OF CITY SIZE ($CS$), DURABLE-NONDURABLE DUMMY ($D$), AND INITIAL INDEX OF SKILL LEVEL ($S$)

Two-digit Manufacturing Industries

1950-60

$\bar{R}^2 = .519$ $\quad \dot{W} = .111 - .0201\ LS + .253\ U - .0314\ C + 2.75\ P$
$\qquad\qquad\quad$ (.175) $\quad$ (.242) $\quad$ (.0916) $\quad$ (1.55)*

$\bar{R}^2 = .731$ $\quad \dot{W} = -.746 + .197\ LS + .285\ U - .0298\ C - .936\ P + 1.91\ \dot{S}$
$\qquad\qquad\quad$ (.154) $\quad$ (.205) $\quad$ (.0688) $\quad$ (1.62) $\quad$ (.536)**

$\qquad\qquad\quad -.00696\ CS$
$\qquad\qquad\quad$ (.164)

$\bar{R}^2 = .735$ $\quad \dot{W} = -.736 + .148\ LS + .297\ U - .0656\ C - .114\ D - .0000538\ S$
$\qquad\qquad\quad$ (.126) $\quad$ (.207) $\quad$ (.0756) $\quad$ (.379) $\quad$ (.000132)

$\qquad\qquad\quad +1.96\ \dot{S}$
$\qquad\qquad\quad$ (.633)

$\bar{R}^2 = .758$ $\quad \dot{W} = -.604 + .155\ LS + .181\ U + 1.60\ \dot{S} + .0283\ CS$
$\qquad\qquad\quad$ (.119) $\quad$ (.158) $\quad$ (.376)** $\quad$ (.151)

$\bar{R}^2 = .766$ $\quad \dot{W} = -.590 + .161\ LS + .193\ U + 1.59\ \dot{S}$
$\qquad\qquad\quad$ (.110) $\quad$ (.137) $\quad$ (.352)**

$\bar{R}^2 = .920$ $\quad \Delta W = -60.6 - .00158\ W \cdot LS + 78.0\ U + .0567\ \Delta S$
$\qquad\qquad\quad$ (.106) $\qquad\qquad$ (17.1)** $\quad$ (.00864)**

$\bar{R}^2 = .924$ $\quad \Delta W = -60.5 + 77.8\ U + .0568\ \Delta S$
$\qquad\qquad\quad$ (11.9)** $\quad$ (.00821)**

Sources: Average hourly earnings [33]; Index of skill level [28] [29] [30] [31]; Degree of unionization [2] and [11, Tables 74 and 76]; Degree of concentration in product markets [9]; After tax rate of return on equity [38]; Index of city size [32].

spond relatively slowly to postwar excess demand. However, once it became clear that demand conditions had permanently altered, wage rates and employment in these industries would have adjusted more rapidly. Since the degree of unionization is positively correlated with skill, the change in the union-nonunion wage differential, as measured here, may in part register a differential response to excess demand associated with differences in employer policies with respect to labor turnover.

Reder's hypotheses hinge on the presence of general excess demand for goods and labor immediately following World War II. When there is general excess demand, the recruitment of labor by any one industry

tends to be more directly competitive with others since there is no pool of unemployment to be drawn upon. Thus, in periods of full and over-full employment the short-run elasticity of labor supply to an industry is likely to be lower than in less tight labor markets.[25] Industries with a faster rate of response to excess product demand would have increased wages at a relatively high rate so long as the short-run elasticity of labor supply was low. Industries with slower responses would have made lagged wage and employment adjustments; and once the excess demand had spent itself, short-run elasticities of labor supply would have tended to increase. On both accounts, the wage differentials that had been opened up by general excess demand would have gradually disappeared.

A proxy measure for differences in the response of industries to excess demand might be the degree of concentration in product markets. As pointed out above, wage changes for the full decade are not significantly related to this variable. Reder suggests that durable goods industries tend to have the characteristics associated with a delayed adjustment of capacity to excess demand—namely high capital-output ratios and relatively long-lived productive capacity. But a dummy variable, with a value of one for durable and zero for nondurable goods industries, does not have the anticipated positive influence (Table 3). Thus, this alternative hypothesis does not appear to be capable of explaining the measured increase in the union-nonunion wage differential.

The industry skill level tends to vary positively with the degree to which employers desire low labor turnover. It would therefore tend to vary inversely with the speed of response of employers to excess demand, insofar as the desire for low labor turnover is an important determinant of the speed of response. Employers in high-wage industries might have responded more slowly to excess demand in the late 1940s, subsequently compensating for the possible adverse effect on relative wages. However, contrary to what would be anticipated on the basis of the labor turnover argument, skill level does not have a significant influence on wage changes (Table 3).

## III. Effect of Unionism on the Manufacturing Money Wage Level

An explanation of the inflationary bias of the Phillips curve in the fifties has been found in the union disequilibrium hypothesis. The amount by which the increase in the union-nonunion wage differential contributed to the inflationary bias can be estimated by calculating the effect of the union adjustment on the manufacturing wage level and determining the length of time required for it to be completed.

[25] Statistical evidence in support of this point appears in Bowen [1, pp. 55–66]. See also Table 4 of this paper.

Assume that, during the period of union adjustment, nonunion money wages increased at a normal rate in relation to the unemployment rate. The estimated effect of unionism on the manufacturing money wage level can then be obtained from the regression equation in Table 2. This shows an increase in the union-nonunion wage differential of 12.9 percentage points.[26] Assuming that nonunion wages advanced normally in relation to the unemployment rate, the effect of the union adjustment on the manufacturing money wage level is arrived at by multiplying the estimated increase in the union-nonunion wage differential times the degree of unionization in manufacturing (.666).[27] Thus, over the decade of the fifties, manufacturing money wages are estimated to have risen by 8.6 percentage points in excess of the rate of change produced by excess demand.

To confirm that this cost inflation was only temporary, wage changes in the period 1950–63 were broken down into three cyclical subperiods (see Table 4). The increase in the relative wage of union members in manufacturing is evident in 1950–54 and 1954–58, but not in 1958–63. Thus, the union adjustment towards an equilibrium relative wage appears to have been completed by 1958. There is also reason to believe that it took place during years of low unemployment. Bert Hickman [7, Ch. 14] points out that manufacturing money wages increased more rapidly during business expansions in the 1950s than in the 1920s, while postwar wage behavior during business contractions did not differ noticeably from that of earlier years. Besides Hickman's evidence on this point, Robert France's estimates [5] of the U. S. Phillips curve indicate a greater sensitivity of wage changes to the unemployment rate

[26] In the fifties, interindustry wage differentials were widening along with occupational wage differentials. Since census industry degrees of unionization are positively correlated with average earnings, the intercorrelation between unionism and market-determined wage changes may bias this estimate upward.

[27] The rationale for this calculation is as follows. The average wage in manufacturing may be written as $W = W_{nu}(1-U) + DS'W_{nu}U$, where $W$ = average wage of nonunion workers, $U$ = degree of unionization in manufacturing, $D$ = one plus the union-nonunion wage differential, $S'$ = the ratio of the average skill level of union workers to the average skill level of nonunion workers. Differentiating this equation with respect to time and dividing by $W$ gives:

$$\frac{\Delta W}{W} = \left[ \frac{U D \Delta S'}{1 - U + DS'U} + \frac{\Delta W_{nu}}{W_{nu}} \right] + \left[ \frac{S'}{1 - U + DS'U} U \Delta D \right].$$

The first bracketed term of this expression contains the portion of the total percentage change in the money wage level which can be attributed to the force of excess demand. The portion which is due to movement in the union-nonunion wage differential is given by the second bracketed term, and this is the quantity to be estimated. The exact values of $S$ and $D$ are not certain. But it is known that $S' > 1$ and $D > 1$, and it is probably true that

$$\frac{S'}{1 - U + DS'U}$$

is close to unity. Therefore, $\Delta W/W \approx$ change due to excess demand $+ U \Delta D$.

TABLE 4—PERCENTAGE CHANGE ($\dot{W}$) AND CENTS PER HOUR CHANGE ($\Delta W$) IN AVERAGE HOURLY EARNINGS REGRESSED ON DEGREE OF UNIONIZATION ($U$), INDEX OF CITY SIZE ($CS$), AND INDEX OF LABOR SUPPLY ($LS$)

Bituminous Coal Mining, Contract Construction, Crude Petroleum and Natural Gas Fields, Metal Mining, Quarrying and Nonmetallic Mining, Retail Trade, Wholesale Trade, and Two-digit Manufacturing Industries

1950–54
$\bar{R}^2 = .233$   $\dot{W} = .205 + .0931\ U - .0896\ CS + .139\ LS$
           $(.0381)^* \quad (.0572) \quad (.0523)^{**}$

$\bar{R}^2 = .182$   $\dot{W} = .180 + .0792\ U + .107\ LS$
           $(.0383)^* \quad (.0497)^*$

$\bar{R}^2 = .219$   $\Delta W = 19.4 + 21.2\ U + .0300\ W \cdot CS + .134\ W \cdot LS$
           $(8.35)^{**} \quad (.0679) \quad (.0947)$

$\bar{R}^2 = .247$   $\Delta W = 20.2 + 22.5\ U + .149\ W \cdot LS$
           $(7.66)^{**} \quad (.0871)^*$

1954–58
$\bar{R}^2 = .246$   $\dot{W} = .129 + .0970\ U - .0200\ CS + .0694\ LS$
           $(.0301)^{**} \quad (.0402) \quad (.0352)^*$

$\bar{R}^2 = .272$   $\dot{W} = .124 + .0928\ U + .0635\ LS$
           $(.0284)^{**} \quad (.0326)^*$

$\bar{R}^2 = .368$   $\Delta W = 12.8 + 29.8\ U + .0288\ W \cdot CS + .103\ W \cdot LS$
           $(8.47)^{**} \quad (.0506) \quad (.0684)$

$\bar{R}^2 = .388$   $\Delta W = 13.6 + 31.7\ U + .114\ W \cdot LS$
           $(7.66)^{**} \quad (.0644)^*$

1958–63
$\bar{R}^2 = -.0632$   $\dot{W} = .158 - .0213\ U + .0421\ CS + .00177\ LS$
            $(.0310) \quad (.0451) \quad (.0606)$

$\bar{R}^2 = -.0149$   $\dot{W} = .158 - .0217\ U + .0427\ CS$
            $(.0269) \quad (.0388)$

$\bar{R}^2 = .193$   $\Delta W = 23\ 8 + .0571\ U + .131\ W \cdot CS - .0690\ W \cdot LS$
           $(.886) \quad (.0492)^{**} \quad (.0900)$

$\bar{R}^2 = .214$   $\Delta W = 22.8 + .377\ U + .116\ W \cdot CS$
           $(.775) \quad (.0445)^{**}$

*Sources:* Average hourly earnings [33] [37]; Degree of unionization [2] [11, Tables 74 and 76]; Index of city size [32]; Index of labor suply [2] [11, Tables 74 and 76] [33] [37].

in 1947–59 than in a comparable pre-1929 period; and Bowen [1] found significantly positive partial correlation coefficients between the degree of unionization and the rate of change of money wages only in the low-unemployment years of 1950–53 and 1955–57. Therefore, it is estimated that unionism shifted the manufacturing Phillips curve upward in the

fifties by an amount somewhat in excess of 1 percentage point, in the region of full employment.

## IV. *Summary and Conclusions*

A summary interpretation of the inflationary bias manifested by the Phillips curve of the fifties can now be given. Unionism was found to be responsible for only a relatively small proportion of interindustry differences in average earnings, the larger proportion being due to differences in industry skill mixes. But a significant increase in the union-nonunion wage differential during the 1950s was estimated. As the differential increased, the opportunity cost of foregone union membership would have eventually dissuaded unions from bargaining for further inflationary gains. That this did happen is confirmed by a subperiod analysis of the growth in the differential and by the fact that wage behavior in the sixties has been less inflationary than would have been anticipated on the basis of the experience of the fifties.[28] The Council of Economic Advisers' guideposts for noninflationary wage and price behavior may have helped to curb any further increase in the union-nonunion wage differential. It is at least equally likely, however, that the differential was at an equilibrium level before the guideposts were promulgated.

I have suggested why organized labor probably was in disequilibrium with respect to its relative wage at the beginning of the fifties. Union membership grew rapidly in the early forties during the period of wartime wage controls. This is likely to have compressed the union-nonunion wage differential since the wages of new union members were probably kept at competitive levels by wage controls. The phenomenon of union-wage rigidity would have postponed an adjustment of industry wage differentials to the new distribution of unionism until after the postwar demand inflation. The rigidity of union wages may well have acted to reduce the union-nonunion wage differential even further. Unfortunately, measurement problems preclude an evaluation of the relative roles of wage controls and wage rigidity in creating a disequilibrium for labor unions.

It is concluded that unionism's real impact during the postwar period was in prolonging an inflation initiated by excessive aggregate demand. The total amount of inflation might not have been very different in the absence of unions, but the rigidity of union wages and wartime wage controls caused a period of cost-push inflation to follow classical demand inflation. It would be a mistake to base future monetary and fiscal

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[28] Econometric models of wage behavior estimated from postwar data significantly overpredict the actual rate of advance of manufacturing money wages experienced during 1964–66. See the preface of Perry [15]; also Solow [25, pp. 45–47], and Throop [26, Ch. 3].

policy on a presumption that the trade-off of the fifties between unemployment and wage rate changes will persist. On the contrary, the available evidence very strongly suggests that the period of cost-push inflation already has come to an end.

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# THE CONCEPT OF THE GOLDEN RULE IN THE CASE OF MORE THAN ONE CONSUMPTION GOOD

By Nissan Liviatan and David Levhari*

The concept of the Golden Rule (in short GR) of accumulation has been widely discussed in the modern theory of economic growth.[1] As is well known this Rule characterizes the situation in which society maximizes the steady-state level of consumption per capita. As has been shown in more recent writings, this situation has under certain conditions some optimality properties in programs of capital accumulation with an infinite horizon [3].

The concept of the GR can be extended to two-sector models, where one sector produces a capital good while the other produces a consumption good. This, however, does not bring any new elements into the problem. A more basic generalization, which is the subject of this paper, is to extend the concept of the GR to a growth model based on two or more consumption goods and two or more capital goods. It will be seen that this extension introduces some new aspects. First, instead of the single GR level of per capita consumption we shall now have many alternative GR compositions of consumption related by what we shall call a GR transformation function. Under certain circumstances this may be associated with a choice problem between alternative points on the function. Another new aspect of the GR is brought into the problem by the fact that we are considering more than one capital good. This raises the problem of efficient capital accumulation and its relation to the generalized GR.

The two new aspects of the GR, i.e., the alternative compositions of consumption and the intertemporal efficiency in production (or accumulation), are fully characterized by the case of two goods (which can be used as consumption or as capital). We shall therefore concentrate mainly on this case. The extension to more than two goods will be outlined briefly in the last section.

Various aspects of the GR in a multicommodity world have been discussed by Hahn and Mathews in their well-known survey article.[2] However, their approach to the problem is quite different from ours. In particular they base their discussion on linear economic models, using activity analysis formulation, while our analysis follows more closely

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[1] See, for example, E. S. Phelps [4], [5] and J. Robinson [6].
[2] See Hahn [2, pp. 880–2].

E. Phelps and Dorfman, Samuelson, and Solow [1, Ch. 12] using neoclassical production functions. Moreover, we discuss in much greater detail the existence of the generalized GR and the properties of the GR transformation function.

## I. *A Restatement of the GR in the Single Commodity Case*

Let us first restate briefly the main aspects of the concept of the GR in the single commodity case. The results are of course well known, but we wish to present them in a way that will be a convenient stepping stone for the subsequent generalizations.[3] Consider a production function

$$(1) \qquad S(t+1) + C(t+1) = F[S(t), L(t)]$$

which shows how this year's capital stock $S(t)$ and labor force $L(t)$ can produce next year's capital stock $S(t+1)$ and consumption $C(t+1)$. We assume constant returns to scale and positive and decreasing marginal products. We also assume that the marginal product of $S(t)$ is not less than unity, i.e., that the *net* rate of return on capital is non-negative.

Let us assume now that $L(t)$ increases at a constant, externally given rate $g-1$ ($>0$) so that $L(t)=Lg^t$ where $L$ denotes some initial value. Let us further restrict ourselves to situations where $S(t)$ and $C(t)$ increase also at the same rate as labor, i.e., $S(t)=Sg^t$ and $C(t)=Cg^t$, where $S$ and $C$ are initial values (we shall comment later on the existence of a balanced growth solution). Dividing (1) by $L(t)=Lg^t$ and using lower case letters to denote per-worker variables we obtain

$$(2) \qquad c = \frac{1}{g} F(s, 1) - s$$

where we have made use of the assumption of balanced growth and of constant returns to scale. Our problem is to maximize $c$ as a function $s$.

The nature of this problem is illustrated in Figure 1, where we make use of the fact that maximizing $c$ is the same thing as maximizing $gc$ [$=F(s, 1)-gs$]. The form of $F(s, 1)$ reflects our assumptions about the production function with the additional assumption that $F(0, 1)=0$. In Figure 1 the maximum corresponds to the point $Q$ where $s=s^*$. It should be noted that in some cases the maximum may not exist (for a positive value of $s$) because the slope of $F(s, 1)$ may never equal $g$. A condition which is sufficient to ensure a maximum for some given value of $g$ is that the curves intersect at some positive values of $s$ (like $s'$ in Figure 1). Since the function $f(s)\equiv F(s, 1)$ starts at the origin and is

[3] In the presentation of the model we shall depart in one respect from the standard treatment of this kind of problem, namely we shall use a discrete instead of a continuous time variable. This is only a difference in form and not in substance. Our reason for preferring the discrete model is that our analytic framework (and notation) is based to a large extent on the discrete model of efficient capital accumulation [1, Ch. 12].
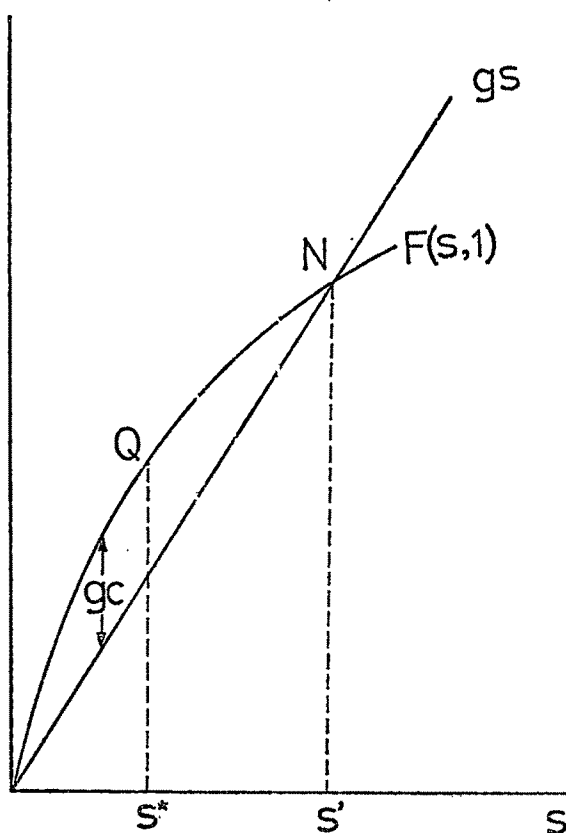
FIGURE 1

concave, the intersection implies the existence of a maximum. If we wish to ensure an intersection for *any*[4] value of $g$, we have to assume that $f(s)$ is "well behaved," in the sense that $df(0)/ds = \infty$ and $df(\infty)/ds = 1$.

It may be noted that a feasible balanced growth solution, i.e., one which yields positive $c$, is not automatically ensured for any arbitrary value of $s$. In particular, to the right of the intersection point $N$, balanced growth requires negative $c$ and is therefore impossible. However, this difficulty does not affect the existence of a GR solution since the latter is always located to the left of the intersection point (if one exists).

The first order condition for a maximum of $c$ is

(3)
$$\frac{dc}{ds} = \frac{1}{g} \frac{df(s)}{ds} - 1 = 0$$

[4] Where of course $g \geq 1$.

or

$$\frac{df}{ds} \equiv \frac{\partial F}{\partial S} = g.$$

This implies the well-known result that, when consumption per capita is maximized, the net rate of profit on capital, $(\partial F/\partial S) - 1$, must equal the rate of growth of population $g-1$. Define saving per capita by

$$v(t) = \frac{S(t + 1) - S(t)}{L(t)}$$

which reduces in balanced growth to $v = s(g-1)$. Now, under competition profits per capita are given by

$$\pi = s\left(\frac{\partial F}{\partial S} - 1\right).$$

It then follows from (3) that $v = $ , i.e., saving equals profits. These are the two basic characteristics of the GR.

The fact that the GR represents maximum (balanced growth) consumption per capita does not in itself imply that the optimal policy of a society is to reach this state of affairs. It may well be that the sacrifice in terms of current consumption in order to arrive at the GR situation may outweigh the gains in terms of future consumption. Indeed, if society has a positive discount rate on future consumption, then an optimal program for an infinite horizon will converge to a stationary level of consumption per capita which is smaller than that of the GR. If has been shown, however, that if society has no time preference for present consumption, then under the standard assumptions, the optimal consumption program will converge to its GR level [3].

## II. *Balanced Growth with Two Consumption Goods*

Let us now assume that we have *two* goods each of which can be used both in production and in consumption. Denote by $S_i(t)$ and $C_i(t)$ the capital stock and consumption level respectively of the $i$th good in year $t$. The production function can now be expressed by[5] (say)

(4)   $S_2(t + 1) + C_2(t + 1) = F[S_1(t + 1) + C_1(t + 1), S_1(t), S_2(t), L(t)]$

where the first argument in $F(\ )$ is an output and the other three are inputs. It is understood that $F(\ )$ specifies the maximum values of $S_2(t+1) + C_2(t+1)$ for given values of the arguments of $F(\ )$. We

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[5] This is the same function as in Dorfman *et al.* [1, p. 309], with the addition of the input $L(t)$. We do not introduce depreciation explicitly, but one can interpret (4) as representing *net* outputs of both goods under the assumption that depreciation takes place at a constant exponential rate (which may be different for each good).

assume that $F(\quad)$ is continuous and differentiable, denoting the partial derivatives of $F(\quad)$ with respect to the $i$th argument by $F_i$. We then assume that $F_1 < 0$ (an output–output relation) and $F_i > 0$ for $i = 2$, 3, 4 (an output–input relation). Since $F_3 - 1$ is a net own rate of return, we assume, as in the single-good case, $F_3 \geq 1$. We also assume that $F(\quad)$ is linear homogeneous in its four arguments.

Let us assume that labor grows at a constant, exogenously given rate $g - 1$ so that $L(t) = Lg^t$. Because of constant returns to scale we may then divide all the variables in (4) by $Lg^t$. Denoting per-worker variables, such as $S_2(t)/L(t)$, by lower case letters we may express (4) as

$$(5) \quad s_2(t + 1) + c_2(t + 1) = \frac{1}{g} F[gs_1(t + 1) + gc_1(t + 1), s_1(t), s_2(t), 1].$$

As in the single good model we assume that $F(\quad)$ is concave at every point of the per-worker variables in such a way that the (Hessian) matrix formed by the second order partial derivatives $[F_{uv}]$ $u, v = 1, 2, 3$ is everywhere negative definite[6]. (This implies, of course, among other things, that all $F_{uu} < 0$. i.e., the marginal products are decreasing and so is the marginal rate of transformation between outputs). This is in a sense the "usual" kind of assumption about the production function. Thus suppose that $L(t)$ is fixed and $F(\quad)$ relates to a competitive firm. Then the existence of a regular maximum profit position restricts $[F_{uv}]$ to being negative definite in some region around the optimal point. In our case we extend this condition to the whole range.

In addition to the foregoing properties of $F(\quad)$ let us introduce the important assumption, which is usually taken for granted, that the system is "productive." This means that the system is capable of capital accumulation or alternatively that it can provide some consumption of both goods in addition to the reproduction of last year's capital stocks. This can be stated formally as follows: for any value of $L(t)$, there exists a range of $S_1(t)$ and $S_2(t)$ for which the production function (4) satisfies

$$(6) \qquad S_i(t + 1) + C_i(t + 1) > S_i(t) \qquad (i = 1, 2).$$

It is easily seen that the productiveness assumption (6) implies that the system is capable of a stationary-state solution, with positive consumption levels, for a constant level of the labor force. This means that for each constant $L$ there exists a range of values of $S_i(t+1) = S_i(t) > 0$ and $C_i(t+1) = C_i(t) > 0$, $i = 1, 2$, which satisfy the equation

$$(7) \qquad s_2 + c_2 = F(s_1 + c_1, s_1, s_2, 1)$$

where (7) is equation (5) in a stationary state ($g = 1$). Now the fact that

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[6] The Hessian corresponding to the *four* arguments in $F(\quad)$ is of course negative *semi-definite* of rank 3 because of constant return to scale.

we can have a stationary state with $c_i > 0$ implies that we can have balanced growth for a certain range of values of $g > 1$. This can be seen as follows.

In a balanced growth we have, for all $t$, $S_i(t+1) = gS_i(t)$, and $C_i(t+1) = gC_i(t)$, $i = 1, 2$, so that (5) can be written as

$$(8) \qquad c_2 = \frac{1}{g} F[gs_1 + gc_1, s_1, s_2, 1] - s_2.$$

The existence of a balanced growth solution means that there exists a positive value of (8) at some positive values of $s_1$, $s_2$, and $c_1$ for a given value of $g > 1$. We know already, by the productiveness assumption, that there exists a positive solution for (8) with $g = 1$. Starting with a point that constitutes such a solution let us fix the values of $s_1$, $s_2$, and $c_1$ and let us consider $c_2$ as a function of $g$ only. Differentiating (8) partially with respect to $g$, at the point $g = 1$, we obtain

$$(9) \qquad \frac{\partial c_2}{\partial g} = (s_1 + c_1)F_1 - F$$

which is negative because $F_1 < 0$. However, since we started with a positive $c_2$ there exists a sufficiently small range where $g > 1$ and $c_2$ is still positive. This proves the existence of balanced growth for some range of $g > 1$.

We may strengthen the foregoing argument by noting that the increase in $g$ (from $g = 1$ in a stationary state solution) may also be offset (or "absorbed") by a reduction of $c_1$. We are also free to vary $s_2$ from its initial stationary state level in such a way as to increase the value of the righthand side of (8). The latter variations in $c_1$ and $s_2$ increase the range of $g > 1$ which permits balanced growth. Indeed the latter range may extend, under certain conditions, to all values of $g > 1$.

Let us consider, from now on, a particular value of $g$ for which the system is capable of balanced growth. To this value of $g$ there corresponds a range of positive values $s_1$, $s_2$, and $c_1$ for which (8) is positive. There is also a wider region, say $R$, of positive $s_1$, $s_2$, and $c_1$ satisfying $F(gs_1 + gc_1, s_1, s_2, 1) > 0$. It is the latter region on which our following analysis is based. Note that in $R$ we require maintainable levels only for $s_1$.

We have now reached the fundamental problem which can be stated as follows: consider $c_2$ in (8) as a function of $s_1$ and $s_2$ ($c_1$ being a parameter). Does this function,

$$(10) \qquad c_2 = \frac{1}{g} f(s_1, s_2; c_1) - s_2 \equiv \frac{1}{g} F(gs_1 + gc_1, s_1, s_2, 1) - s_2,$$

where $f(\ ) \equiv F(\ )$, possess a (positive) maximum with respect to $s_1$ and $s_2$? If the answer is positive, then by maximizing $c_2$ for alternative values of the parameter $c_1$ we are led to a functional relationship between $c_2$ and $c_1$ which is the GR transformation function. We turn now to investigate the conditions for the existence of the foregoing maximum.

## III. *The Existence of the GR Transformation Curve*

Consider the foregoing production function in the form

(11) $$f(s_1, s_2; c_1) \equiv F(gs_1 + gc_1, s_1, s_2, 1)$$

with $c_1$ as a parameter. Let us show first that $f(s_1, s_2; c_1)$ as a function of $s_1$ and $s_2$ posseses a Hessian $[f_{ij}]$ which is negative definite. The first-order partial derivatives of $f(\ )$, obtained from (11), are given by

(12) $$f_1 = gF_1 + F_2 \quad \text{and} \quad f_2 = F_3.$$

The second-order partial derivatives, calculated from (12) are

(13) $$f_{11} = g^2 F_{11} + 2g F_{12} + F_{22}; \quad f_{12} = gF_{31} + F_{32}; \quad f_{22} = F_{33}.$$

Now the Hessian matrix $[f_{ij}]$ is negative definite if the sum

$$\sum_{i=1}^{2} \sum_{j=1}^{2} x_i x_j f_{ij}$$

is negative for arbitrary values of $x_1$ and $x_2$ not both zero. However, using (13) we may express this sum as

(14) $$\sum_{i=1}^{2} \sum_{j=1}^{2} x_i x_j f_{ij} = \sum_{u=1}^{3} \sum_{v=1}^{3} y_u y_v F_{uv}$$

where $y_1 = x_1 g$, $y_2 = x_1$, and $y_3 = x_2$. We see therefore that if $[F_{uv}]$ is negative definite this must also be true[4] of $[f_{ij}]$. It then follows from the properties of negative quadratic forms that $f_{ii} < 0$ ($i = 1, 2$) and $f_{11} f_{22} - f_{12}^2 > 0$.

Let us return now to the problem of maximizing $c_2$ in (10) for a given value $c_1$. In order to examine the existence of the maximum it will be convenient to break down the maximization problem into two stages. Consider first the problem of maximizing $c_2$ with respect to $s_1$ for given values of $s_2$ and $c_1$ (say $s_2^0$ and $c_1^0$). Since in this case $s_2$ in (10) is constant we have essentially to examine the conditions for the existence of a maximum of $f(s_1, s_2^0, c_1^0)$ as a function of $s_1$. Suppose that $s_1$, $s_2^0$ and $c_1^0$ are in $R$ so that $f$ is positive. Since $f_{11} < 0$ and $f > 0$ we know that a sufficient condition for a positive maximum of $f(s_1, s_2^0, c_1^0)$ as a function of $s_1$ is that $f_1$ should change sign as in the curve $TPV$ in Figure 2 (if $f$ as a function of $s_1$ behaves like $TPZ$ then $f$ has no maximum).

Using (12) we may express $f_1$ as $f_1 = (-F_2/F_1 - g)\ (-F_1)$, where

$-F_1>0$. Now it can be verified by direct differentiation of $F(\ )$ that $-F_2/F_1$ is the marginal product of $S_1$ as an input in producing $S_1$ as an output. In other words, $-F_2/F_1$ is the "gross" own rate of return on $S_1$, the net own rate being $-F_2/F_1-1$. It follows therefore that a sufficient condition for the existence of a maximum of $f$ as a function of $s_1$, under the foregoing conditions, is that the gross own rate of return of $S_1$ should at some points be larger and other points be smaller than $g$.

More basic conditions to ensure the foregoing relationship can be obtained as follows. Consider an intersection of $f(s_1, s_2^0, c_1^0)$ with any horizontal line. This determines a certain value of $s_1$, say $s_1'$, which satisfies $f(s_1', s_2^0, c_1^0) = F(gc_1^0+gs_1', s_1', s_2^0, 1) = k^0>0$. Let us return to (5) and form the equation $F[gc_1(t+1)+gs_1(t+1), s_1(t), s_2^0, 1] = k^0$. This determines, for a given $s_2(t) = s_2^0$ and $k^0$, a production function for the first good, say $gc_1(t+1)+gs_1(t+1) = v[s_1(t); s_2^0, k^0]$, which satisfies $F[v(s_1(t); s_2^0, k^0), s_1(t), s_2^0, 1] = k^0$ identically in $s_1$ $(t)$. It can be deduced from the properties of $F(\ )$ that $v_1 \geq 1$ and $v_{11}<0$.

Let us now assume that for any $s_2^0$ and $k^0$ derived in the foregoing manner $v(\ )$ has the following properties: $v(s_1^*; s_2^0 \ k^0) \leqq gs_1^*$ and $v_1(s_1^*; s_2^0, k^0) > g$ for some $s_1(t) = s_1^* \geqq 0$, and also $v_1(\infty; s_2^0, k^0) = 1$.

If we apply the analysis of Figure 1 to $v(s_1; s_2^0, k^0)$ then we see that the foregoing conditions imply that the curve corresponding to $v(\ )$ cuts the $gs_1(t)$ line at two points (where one point may, as a special case, be the origin). Here we use the fact that we start with a point in $R$, i.e., with a situation where we have $c_1^0>0$ for some $s_1$, $s_2^0$ and $k^0$ [where $s_1 = s_1(t) = s_1(t+1)$]. This means that for some values of $s_1(t)$ we must have $v > gs_1(t)$. Under this assumption the foregoing conditions ensure a double intersection. It also follows that $c_1 = 1/g \, v(s_1; s_2^0, k^0) - s_1$ possesses a maximum as a function of $s_1$ (to be denoted $\bar{c}_1$).

By assumption $s_1'$ satisfies $c_1^0 = 1/g \, v(s_1'; s_2^0, k^0) - s_1'$. It follows however from the double intersection of $v(\ )$ with $gs_1$ that, if $c_1^0 \neq \bar{c}_1$, there must be one additional value of $s_1$, say $s_1''$, which satisfies the foregoing equation. It follows therefore that both $s_1'$ and $s_1''$ satisfy $F(gc_1^0+gs_1, s_1, s_2^0, 1) = k^0$ which implies that the curve $f(s_1, s_2^0, c_1^0)$ in Figure 2 is interesected at *two* points by the horizontal line corresponding to $k^0$. Since $f_{11}<0$ this ensures the existence of a maximum of $f$ as a function of $s_1$. If $c_1^0 = \bar{c}_1$, so that $s_1' = s_1''$, then $f$ is tagent to the horizontal line which (together with $f_{11}<0$) implies immediately that $f$ has a maximum. If the foregoing conditions are satisfied and in addition $s_2^0$ and $c_1^0$ permit balanced growth then we also have a positive (partial) maximum for stationary $c_2$ as a function of $s_1$.

If we increase the fixed value of $s_2$ from $s_2^0$ to $s_2^1$ then we have a new curve $f(s_1, s_2^1; c_1^0)$ which is higher than the foregoing one because $f_2 = F_3 > 0$. Similarly the horizontal line $gs_2$ moves upward. The maximum point moves from $Q_0$ to $Q_1$ in Figure 3, where the maximum value
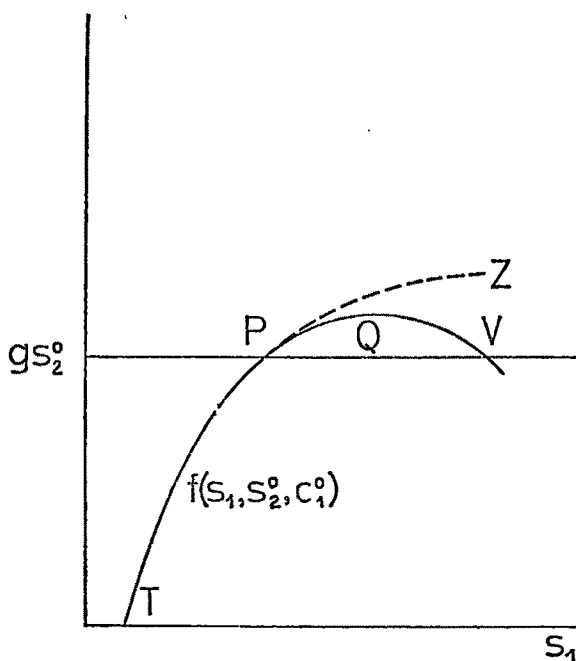
of $c_2$ will increase in the new situation if $F_3 > g$ and conversely if $F_3 < g$. A priori one cannot say that as the parameter $s_2$ increases we must reach a point where $F_3 < g$ so that $c_2$ declines. This seems, however, a reasonable assumption if we remember that one of the factors of production, namely labor, is all the time held constant (in per capita terms). Suppose that the maximized value of $c_2 = 1/gf(s_1, s_2{}^0; c_1{}^0) - s_2{}^0$ declines as we increase the fixed values of $s_2$, until it becomes zero at (say) the point $N$ in Figure 2 and negative afterwards. This means that beyond the point $N$ we cannot have balanced growth, although formally the maximum of $c_2$ as a function of $s_1$ exists.

Suppose alternatively that starting with $s_2{}^0$ in Figure 3 we reduce the fixed value of $s_2$. We shall assume that when $s_2$ (as an input) is zero $f$ cannot be positive regardless of the value of $s_1$ (and of $c_1$). Taking into account that the economy is also required to produce a given amount of $c_1$, it is possible, although not necessary, for the stationary $c_2$ to become zero for positive and sufficiently small values of $s_2$.

To summarize, when we consider the locus of partial maximum points for alternative fixed values of $s_2$ and a given value of $c_1$, we obtain a curve such as $LQ_0N$. Usually (but not necessarily always) only part of this curve will yield feasible balanced growth points. In Figure 3, for
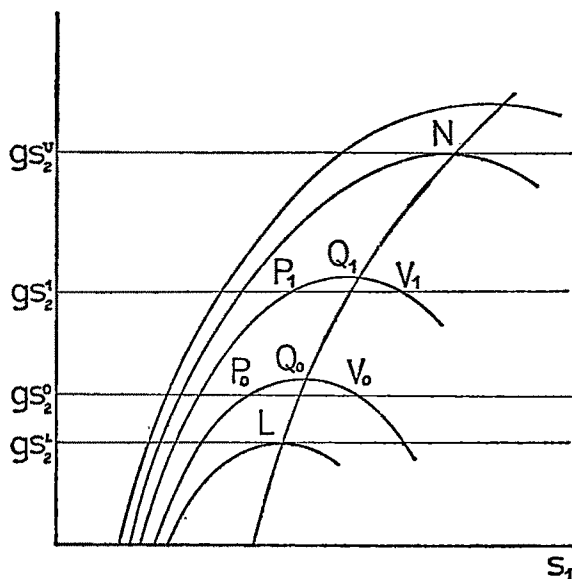
FIGURE 3

example, we assume that the upper limit of feasible balanced growth is for $s_2{}^U$ and the lower limit is for $s_2{}^L$. Clearly, as we change the fixed value of $c_1$ we obtain a new locus of partial maximum points.

The foregoing partial maximization leads to a functional relationship between any pair of given values of $s_2$ and $c_1$ consistent with $R$ and the corresponding value of $s_1$ which maximizes stationary $c_2$. This relationship is defined implicitly by $f_1 = gF_1 + F_2 = 0$, and can be expressed by

$$(15) \qquad\qquad s_1 = h(s_2; \overset{0}{c_1}),$$

so that

$$(16) \qquad\qquad f_1[h(s_2; \overset{0}{c_1}), s_2; \overset{0}{c_1}] \equiv 0$$

identically. Inserting (15) in (10) we can express the conditionally maximized value of $c_2$ (to be denoted by $c_2{}^*$) as a function of $s_2$ with $c_1{}^0$ as a parameter, i.e.,

$$(17) \qquad\qquad \overset{*}{c_2} = \frac{1}{g} f[h(s_2; \overset{0}{c_1}), s_2; \overset{0}{c_1}] - s_2.$$

This function shows the relationship between $c_2$ and $s_2$ when $s_1$ is "optimally" adjusted (so as to maximize $c_2$).

We now have to investigate the existence of a maximum of $c_2^*$ as a function of $s_2$. For this purpose let us show first that in the production function $q(s_2; c_1^0) \equiv f[h(s_2; c_1^0), s_2; c_1^0]$ the total derivative with respect to $s_2$ is a decreasing function of $s_2$. Differentiate the foregoing function with respect to $s_2$, using (16), to obtain

$$(18) \qquad \frac{dq}{ds_2} = f_1[h(s_2; c_1^0), s_2; c_1^0] \frac{dh}{ds_2} + f_2[h(s_2; c_1^0), s_2; c_1^0] = f_2.$$

Differentiating once more we have

$$(19) \qquad \frac{d^2q}{ds_2^2} = f_{21} \frac{dh}{ds_2} + f_{22}.$$

The expression $dh/ds_2$ can be evaluated by differentiating (16). This yields

$$(20) \qquad f_{11} \frac{dh}{ds_2} + f_{12} = 0, \qquad \text{i.e., } \frac{dh}{ds_2} = -\frac{f_{12}}{f_{11}}.$$

Substituting in (19) we obtain

$$(21) \qquad \frac{d^2q}{ds_2} = \frac{-f_{21}f_{12}}{f_{11}} + f_{22} = \frac{1}{f_{11}} (f_{11}f_{22} - f_{12}^2) < 0$$

where the negative sign follows from the fact that $f_{11} < 0$ and $f_{11}f_{22} - f_{12}^2 > 0$ as a result of the negative definiteness of $[f_{ij}]$.

We see from the foregoing analysis that the *total* derivative $dq/ds_2$ is similar in two respects to the *partial* derivative $\partial f/\partial s_2$. First we observe that $dq/ds_2 = \partial f/\partial s_2 = F_3$ at any point $[h(s_2; c_1^0), s_2]$. Thus, to a first approximation the two rates of change are the same (it is only the higher order derivatives that differ). Secondly, both derivatives are decreasing functions of $s_2$. We also note that since $f_2 = F_3$ we have $dq/ds_2 = F_3 \geq 1$. We see therefore that the total derivative $dq/ds_2$ has the same analytic properties as the partial derivative $f_2$.

We have now essentially reduced the analysis to the single commodity case described in section I. We have to investigate the maximum of

$$(22) \qquad c_2^* = \frac{1}{g} q(s_2; c_1^0) - s_2$$

as a function of $s_2$, which has essentially the same analytic properties as equation (2). In particular the function $q(\ )$ is upward sloping, concave, with a slope coefficient equal to $F_3 \geq 1$. In addition we know that the curve $q(s_2; c_1)$ in Figure 4 must start from the horizontal axis since

we effectively assumed $q=0$ for sufficiently small $s_2$. We also know that this curve must be above $gs_2$ for some range of $s_2$, whenever the parameter $c_1$ is consistent with balanced growth. (Such values of $c_1$ must exist since by assumption the value of $g$ in question permits balanced growth.) In order to ensure a maximum, with some positive value of $c_2^*$, it is sufficient to assume that, whenever $c_1$ permits balanced growth, the curves $q(s_2; c_1)$ and $gs_2$ intersect, as illustrated in Figure 4, provided $q(0, c_1^0) = 0$.

An alternative formulation of sufficient conditions can be obtained as follows. Differentiating $c_2^*$ with respect to $s_2$ we have

$$(23) \qquad \frac{dc_2^*}{ds_2} = \frac{1}{g} \frac{dq}{ds_2} - 1 = \frac{1}{g} F_3 - 1.$$

Suppose now that $c_1^0$ permits balanced growth and that $s_1$ is always "optimally" adjusted in the sense that $s_1 = h(s_2; c_1)$ according to equation (15). As before, assume $q=0$ for small $s_2$. Then a sufficient condition for the existence of a positive maximum of $c_2^*$ with respect to $s_2$ is that the net own rate of return on $S_2$, i.e.,

$$F_3[gh(s_2; c_1^0) + gc_1^0, h(s_2; c_1^0), s_2, 1] - 1$$

should tend to zero as $s_2$ tends to infinity. It is easily seen that this implies that (23) vanishes for some positive value of $s_2$.

The fact that $c_2^*$ in (22) possesses a maximum (for the given value of $c_1$) implies, of course, that $c_2$ in (10) has a maximum with respect to $s_1$ and $s_2$. Indeed at the maximum position of $c_2^*$ we have

$$(24) \qquad f_1 = gF_1 + F_2 = 0$$

from the first stage of maximization, and

$$(25) \qquad \frac{1}{g} \frac{dq}{ds_2} - 1 = \frac{1}{g} F_3 - 1 = 0$$

from the second stage of maximization. It is seen immediately that these are nothing else but the first order conditions for maximum of (10) with respect to $s_1$ and $s_2$. It follows therefore that the sufficient conditions which we stated at each stage of maximization are sufficient for the existence of the overall maximum.[8]

    [8] It should be stressed that the existence of a maximum of $c_2^*$ in (22) ensures that (24) and (25) are satisfied *simultaneously* by a certain set of $s_1$ and $s_2$. In this connection it may be noted that the existence of solutions of (24) and (25) separately does *not* guarantee a simultaneous solution of both equations. In other words, the existence of a partial maximum of $c_2$ with respect to $s_1$ (for given values of $s_2$) and of a partial maximum of $c_2$ with respect to $s_2$ (for given values of $s_1$) is not sufficient to ensure the existence of an overall maximum.
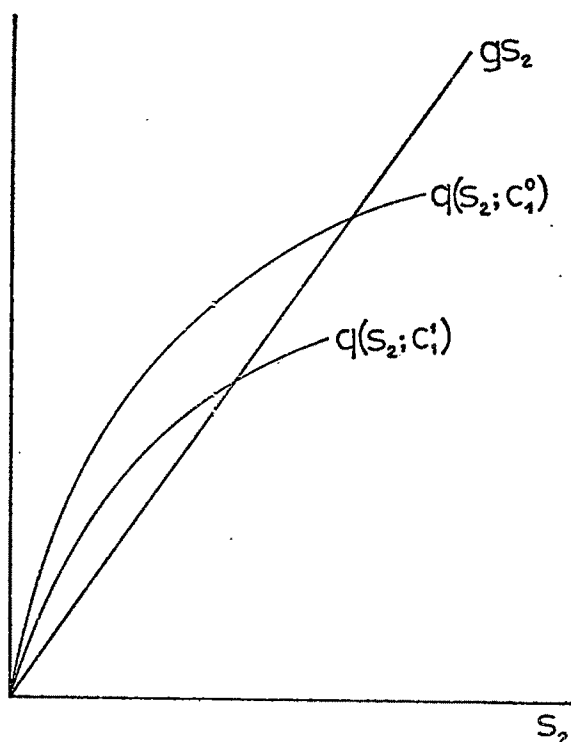
FIGURE 4

The existence of a maximum value of $c_2$ with respect to $s_1$ and $s_2$ for given values of $c_1$ (when the latter permits balanced growth) leads to a transformation curve between $c_2$ and $c_1$. It shows us the maximum stationary value of consumption per capita of the second good for given values of stationary consumption per capita of the first good when both capital stocks are "optimally" adjusted. This curve is therefore a generalization of the concept of the GR level of per capita consumption in the single commodity case. We shall denote the GR transformation curve by $GRTC$.

## IV. *The Nature of the GRTC*

The slope of the $GRTC$ at any point can be computed as follows. Take the total derivative of the basic function

$$(26) \qquad c_2 = \frac{1}{g} F(gs_1 + gc_1, s_1, s_2, 1) - s_2$$

with respect to $c_1$ subject to the equilibrium conditions (24) and (25).

This yields

$$(27) \qquad \frac{dc_2}{dc_1} = \left(F_1 + \frac{F_2}{g}\right)\frac{ds_1}{dc_1} + \left(\frac{F_3}{g} - 1\right)\frac{ds_2}{dc_1} + F_1 = F_1.$$

Thus we see that at any point on the $GRTC$, where $s_1$ and $s_2$ are optimally adjusted, the slope of the $GRTC$ equals the slope of a transformation curve based on fixed values of $s_1$ and $s_2$. Since $F_1 < 0$ we have thus established the (plausible) fact that the $GRTC$ is negatively sloped.

We have assumed earlier that the transformation curve based on fixed $s_i$ is concave ($F_{11} < 0$). Is this also true of the $GRTC$? As one might expect, it is in fact the case. One may obtain this result by differentiating (27), i.e., $F_1$, once more. In order to do this one has to evaluate, among other things, the expressions $ds_i/dc_1$ by differentiating the equilibrium conditions (24) and (25) with respect to the parameter $c_1$. Since the calculations are lengthy and uninteresting we shall state only the final expression. Let $D = f_{11}f_{22} - f_{12}{}^2$, where $f_{ij}$ are defined by (13), and let $E$ denote the determinant of the Hessian $[F_{uv}]$ $u, v = 1, 2, 3$. Then at any point on the $GRTC$ we have[9]

$$(28) \qquad \frac{d^2c_2}{dc_1{}^2} = g\,\frac{D}{E}\,.$$

We know, however, from our earlier discussion that $D > 0$ and that $E$, being an odd-order determinant of a negative definite form, is necessarily negative. Hence (28) is negative so that the $GRTC$ is concave as stated.

The relation between the $GRTC$ and the transformation curves which relate to fixed values of $s_i$ is illustrated in Figure 5. Consider first a point $Q$ on the $GRTC$. Denote the values of $s_i$ which correspond to this point by $s_i{}^Q$ and insert them in (26) to obtain

$$(29) \qquad c_2 = \frac{1}{g}\,F(gs_1{}^Q + gc_1,\ s_1{}^Q, s_2{}^Q, 1) - s_2{}^Q.$$

As we vary $c_2$ and $c_1$ in (29) we trace out a transformation curve where $s_i{}^Q$ are parameters. This curve is denoted $A_0A_0'$ in Figure 5. We have seen earlier that this curve is tangent to the $GRTC$ at $Q$. It can, however, be shown by direct differentiation that the curvature of $A_0A_0'$ is greater than that of the $GRTC$, so that at all other points $A_0A_0'$ is below the $GRTC$.

It should be stressed that we have tangency of the two curves only when the fixed values of $s_i$—such as $s_i{}^Q$—happen to be values which correspond to points on the $GRTC$. Indeed, the $GRTC$ can be considered

[9] It should be clear that when we evaluate (28) we let $s_1$ and $s_2$ be optimally adjusted so as to maximize $c_2$ for given values of $c_1$.
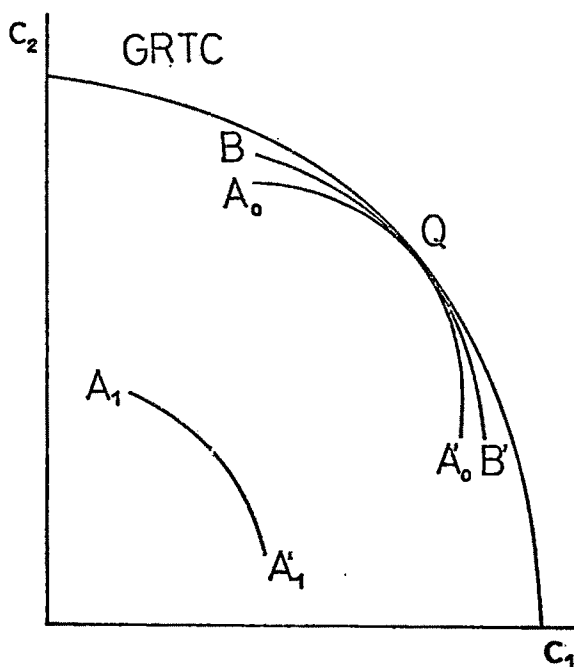
FIGURE 5

as the envelope of the transformation curves with fixed values of $s_i$ where the latter correspond to points on the $GRTC$. If, however, we take fixed values of $s_i$ which do not correspond to a point on the $GRTC$, then the resulting transformation curve will necessarily be below the $GRTC$ throughout, as is illustrated by the curve $A_1A_1'$. We see therefore that the $GRTC$ is not the envelope of all transformation curves based on fixed $s_i$. It is true, however, that the $GRTC$ is the outward frontier of these curves.

Another class of transformation curves of $c_1$ and $c_2$ can be derived if we hold constant only one of the stocks, say $s_2$, while the other is optimally adjusted. Denote this class of curves by $BB'$. One can verify that our foregoing remarks concerning the $AA'$ curves apply equally to the $BB'$ curves. It can also be verified that if we start at a point on the $GRTC$, such as $Q$, then the curvature of $BB'$ will be intermediate between that of $GRTC$ and $A_0A_0'$. The reason for this is, of course, that along $BB'$ one can make more adjustments in the capital stocks than along $AA'$ and less adjustments than along the $GRTC$.

It should be stressed that our discussion is confined only to balanced growth transformation curves. In particular, our statement that the

*GRTC* is the outward frontier of all other transformation curves refers only to balanced growth. Consider alternatively an instantaneous non-balanced growth transformation curve for $c_2(t+1)$ and $c_1(t+1)$. Here we hold constant four capital stocks, namely $s_i(t)$ and $s_i(t+1)$, $i=1, 2$, and we do not commit ourselves to maintainable consumption levels. It is then clear that the instantaneous, nonbalanced growth transformation curve may bear any kind of relationship to the *GRTC*: it may be above or below the *GRTC*, or it may cut it.

We may finally note that the *GRTC* depends on the parameter $g$. Clearly, as $g$ increases the whole *GRTC* shrinks toward the origin.

### V. *Characteristics of the GR in the Two-Commodity Case*

We shall show now that the well-known characteristics of the *GR* in the single-commodity model continue to hold in the two-commodity model as well. Consider first the proposition that in a GR the rate of return on capital equals the rate of growth. In the present model one may speak of two rates of return—one for each capital good. These are given by $-(F_2/F_1)-1$ and $F_3-1$ for the first and second good respectively. However, we find from the equilibrium conditions (24) and (25) that

$$(30) \qquad -\frac{F_2}{F_1} - 1 = F_3 - 1 = g - 1$$

i.e., the net own rates of return are equal in both goods and the common rate equals the net rate of growth. This is true for any point on the *GRTC*.

Consider now the proposition that in a GR saving equals profits. Let $p_i$ be the market price of a unit of $S_i$, where $p_i$ are constant in a balanced growth[10] (these constants will, of course, vary as we move along the *GRTC*). The net profits per unit of each of the capital goods are then $[-(F_2/F_1)-1]\,p_1$ and $(F_3-1)p_2$, so that total profits per capita $(\pi)$ are, in view of (30),

$$(31) \quad \pi = \left(-\frac{F_2}{F_1} - 1\right) p_1 s_1 + (F_3 - 1)p_2 s_2 = (g - 1)(p_1 s_1 + p_2 s_2).$$

Next, define saving per capita, $v(t)$, as the value of capital accumulation per capita, valued at the prices of period $t$,[11] i.e.,

$$(32) \qquad v(t) = \frac{S_1(t + 1) - S_1(t)}{L(t)}\, p_1(t) + \frac{S_2(t + 1) - S_2(t)}{L(t)}\, p_2(t).$$

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[10] This follows from the discussion in Dorfman *et al.* [1, p. 319].

[11] It is not important for our analysis whether we use $p_i(t)$ or $p_i(t+1)$, since in balanced growth these prices remain constant over time.

In a *GR* balanced growth this reduces to

$$v = (g - 1)(p_1 s_1 + p_2 s_2)$$ (33)

i.e., $\pi = v$. Again this holds at any point on the *GRTC*.

## VI. *The Generalized GR and Efficient Accumulation of Capital*

The problem of intertemporal efficiency in capital accumulation can be stated as follows: given a certain consumption program over time, with given initial and terminal $s_i$, does there exist an alternative program which provides more consumption $c_i(t)$, for some $i$ and $t$, and not less for any other $i$ and $t$? If the original program cannot be dominated in this manner then it is said to be intertemporally efficient. It should be stressed that this concept is of a general nature and is not confined to steady states only. We wish now to examine the problem of whether any point on the *GRTC* is intertemporally efficient. We know, of course, that no *balanced* growth path can dominate a point on the *GRTC*. But is there a *nonbalanced* growth path that can do it? We shall now show that this is impossible.

The criterion for efficient accumulation can be obtained as follows [1, p. 313]. We have the instantaneous production function

$$S_2(t + 1) + C_2(t + 1) = F[S_1(t + 1) + C_1(t + 1), S_1(t), S_2(t), L(t)].$$ (34)

We may now use (34) to compute the value of $S_2(t)$ when all variables are moved one period backward. Substituting this value of $S_2(t)$ in (34) we obtain

$$\begin{aligned}
(35) \quad S_2(t + 1) + C_2(t + 1) = F[S_1(t + 1) + C_1(t + 1), S_1(t), \{F[S_1(t) \\
+ C_1(t), S_1(t - 1), S_2(t - 1), L(t - 1)] - C_2(t)\}, L(t)]
\end{aligned}$$

Let us now fix all variables on the righthand side of (35) except for $S_1(t)$. If by changing $S_1(t)$ in the original program we can increase the lefthand side then the program is clearly inefficient. It follows that in an efficient program the derivative of (35) with respect to $S_1(t)$ must be zero, for any two consecutive periods. Differentiating (35) partially with respect to $S_1(t)$ and equating to zero we obtain

$$F_2^{t+1} + F_3^{t+1} F_1^t = 0$$ (36)

where the superscript $t+1$ denotes the fact that the value of the function relates to $t+1$ (and similarly for $t$), and the subscripts as usual denote partial derivatives with respect to the relevant argument.

Note first that in any balanced growth situation condition (36) reduces to

$$(37) \qquad\qquad F_2 + F_3 F_1 = 0$$

where we drop the superscripts. The reason for this is that in a balanced growth all the variables in (34) increase from each period to the next by a constant factor. It follows from the fact that $F(\ )$ is a linear homogeneous function that its derivatives are unaffected by the equiproportionate change in the arguments. It is therefore legitimate to drop the time indices in (36). Writing (37) as

$$(38) \qquad\qquad -\frac{F_2}{F_1} = F_3$$

we see that, for balanced growth situations, the intertemporal efficiency implies that the own rates of return should be equal on both goods. This condition is satisfied automatically at any point on the $GRTC$ since both own rates are there equal to $g$. The generalized $GR$ is therefore intertemporally efficient.

It should be stressed that the converse statement is not true, i.e., a balanced growth program which is intertemporally efficient is not necessarily on the $GRTC$. Thus consider a balanced growth program where the two own rates of return are equal but where this common value is different from $g$. Suppose further that we maximize $c_2$ for each value of $c_1$ subject to the constraint $-(F_2/F_1) = F_3 = \alpha(\neq g)$. This will lead to a transformation curve for $c_2$ and $c_1$ which will be entirely below the $GRTC$, since we do not let the economy adjust the rate of return on capital to the external rate of growth.

## VII. *Optimality Properties of the Generalized GR*

The foregoing analysis does not necessarily imply that it is always optimal for society to aim at reaching the $GRTC$. It is, however, possible to state conditions where this state of affairs is plausible. Consider a society with an infinite planning horizon and with a utility function that is based on consumption per capita of both goods. Assume that society has no time preference for present consumption, i.e., let the social discount rate equal zero. Assume further that the optimal plan converges[12] to stationary values of $c_1$ and $c_2$ (if society happens to be at these consumptions levels then we assume that it will stay there). It is then intuitively plausible that a stationary solution must correspond to a point on the $GRTC$.

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[12] The existence of an optimal plan and its dynamic properties will be investigated by the present authors in a forthcoming paper.

Suppose that we start with arbitrary stationary levels of $c_1$ and $c_2$. We may then assume that an increase (no matter how small) in the stationary values of $c_1$ or $c_2$ will lead to an infinite increase in utility. In other words, since the social discount rate is zero, the present value in terms of utility of an increase in the constant flow of consumption must be infinite. Consider now the properties of a stationary point $(c_1^0, c_2^0)$ which can represent an optimal solution. First we note that no stationary point $(c_1, c_2)$ can be above the $GRTC$. Let us then suppose $(c_1^0, c_2^0)$ is below the $GRTC$. We know however that in this case it is possible to increase the (future) stationary values of $c_1$ and $c_2$ by reducing[13] current consumption. This will lead to an infinite increase in utility, since the loss in utility due to the sacrifice in current consumption is finite. It follows therefore that no stationary point below the $GRTC$ can be optimal. This leads to the conclusion that an optimal stationary plan, if it exists, must correspond to a point on the $GRTC$. (Note that on the $GRTC$ it is not possible to exchange a finite loss for an infinite gain in utility.)

Suppose alternatively that there is a positive social discount rate for future consumption per capita so that an increase in the stationary level of consumption of any of the goods will lead to a finite increase in utility. Suppose that, starting from a balanced growth situation society gives up a unit of current consumption of $c_2$ which leads to loss of utility of (say) $m$ units. This makes it possible, however, to increase the future constant flow of $c_2$ by $1/gF_3 - 1$, as can be verified from (26). Let each additional unit of the constant flow of $c_2$ yield additional utility of $z$ units. Then in a stationary optimum we must have

$$(39) \qquad m = z \left( \frac{1}{g} F_3 - 1 \right)$$

which does not lead to $F_3 = g$ as required for points on the $GRTC$. It follows therefore that if a society with a positive discount rate aims at stationary values of consumption per capita, then these values must be represented by a point below the $GRTC$.

### VIII. *Some Extensions*

The generalized model of the $GR$ can be extended so as to take into account an exponential labor-augmenting (Harrod-neutral) technological change, provided it does not discriminate between the two goods. A neutral technological change of this type will have the same effect on the derivation of the $GRTC$ as an increase in the rate of growth of the labor force. Alternatively, all we have to do in order to deal with this case is to measure the quantity of labor in terms of efficiency units.

[13] We may ignore the inefficient case where this can be accomplished by increasing current consumption.

Finally we may note that we do not get any qualitatively different results as we extend the model to more than two commodities. If instead of two goods we have $n$ goods then the balanced growth production function can be written by analogy with (8) as

$$(40) \quad c_n = \frac{1}{g} F(gs_1 + gc_1, gs_2 + gc_2, \cdots, gs_{n-1}$$

$$+ gc_{n-1}, s_1, s_2, \cdots, s_n, 1) - s_n$$

where $F(\ )$ is based on $2n$ arguments: the first $n-1$ arguments are outputs, the next $n$ arguments are capital stock inputs, and the last argument is a constant equal to unity which indicates that all variables are expressed in per capita terms.

In order to obtain the $GR$ transformation function we maximize $c_n$ with respect to $s_1, \cdots, s_n$ for given values of $c_1, \cdots, c_{n-1}$. The first order conditions are

$$(41) \quad\quad F_{2n-1} = -\frac{F_{n-1+i}}{F_i} = g \quad\quad (i = 1, \cdots, n-1)$$

which means that all the own rates of return must equal the rate of growth of the labor force. This is a generalization of the result obtained earlier. All other results may be generalized by extending the stepwise maximization.

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# COMMUNICATIONS

## Factor Supply and the Direction of Technological Change

In the *Theory of Wages*, Professor Hicks posed the question of the effect of technological change on the distribution of income between capital and labor. We now seem to be approaching an answer to this question as a result of both improved methods [16] and statistical materials [7] [10] [12]. Several recent studies [11] [3] [5] have tried to determine the direction of technological change in the United States from observations on factors of production and their prices. All three of these studies ignored, either inadvertently [3] or by choice [11] [5] the effect of changes in factor supply on the available observations Thus they are subject to a simultaneous-equation bias of unknown dimensions.

This paper eliminates the bias contained in the previous studies of the direction of technological change by constructing and estimating a simultaneous-equation model of the demand for and supply of factors of production for the total private U.S. economy, 1899–1953.

The available data on capital and labor in the U.S. economy in conjunction with the distribution of income between these factors can be employed to derive an aggregate price for capital and labor. This is the material which must be made to reveal the movements in the demand for and supply of capital and labor. There is general agreement that the ratio of capital $(K)$ to labor $(L)$, $X$, has risen in the U. S. economy and that the ratio of the price of capital $(P_k)$ to the price of labor $(W)$, $P$, has fallen.[1] At first glance there seems to be much less agreement concerning the share of $K(S_k)$ and the share of $N(S_L)$ in income. This is partly due to the failure to consider "homogeneous" sectors of the economy [6, pp. 256–57]. The available evidence indicates that $S_L/S_k$ has been stable for the total private domestic economy since the 1880s [8] [6, pp. 256–59]. Within this aggregate, $S_L/S_k$ appears stable for the agricultural sector [6, pp. 256–59], and for the mining and manufacturing sector.[2] Combining these observations with the increasing weight of manufacturing and mining and services relative to agriculture in the total private domestic economy and values of $S_L$ of approximately .16 for agriculture and .74 for manufacturing and mining leads to the conclusion that $S_L$ must have fallen for the service sector (excluding government). Thus I think that we can proceed on the basis of a constant $S_L/S_k$ for the total private economy. The rise in this ratio for the total economy observed by Kravis [11] seems to be due to the increasing weight of "general" government in the economy.

[1] Kravis [11, Table 10, p. 928] and Kendrick [10, Ch. 5, pp. 111–30]. See Appendix A to this paper for the data employed in this study.

[2] Denison [6] and Solow [17]. Solow also demonstrates the stability of factor shares within individual branches of manufacturing and mining.
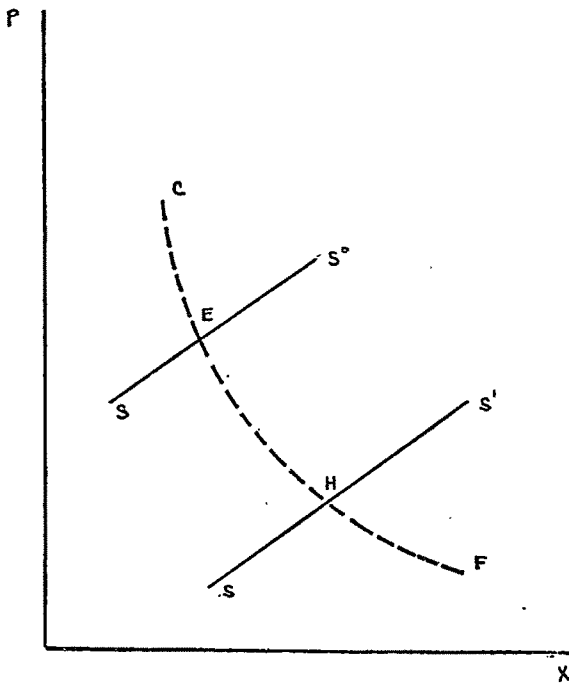
FIGURE 1

Changes in $X$ and $P$ and the stability of $S_L/S_k$ for the total private domestic economy are a result of the interaction of the demand for and supply of factors of production. Kravis has argued that "the behavior of the price and quantity ratios is attributable to the differences in the supply conditions under which capital and labor are provided, and that the demand conditions were permissive rather than determining" [11, p. 941]. His argument may be reformulated in the following model,[3]

(1)                    $X = D(P, t)$    (Demand)

(2)                    $X = S(P)$       (Supply)

where $t$ represents technology. Figure 1 depicts this model. $SS^0$ is the initial supply curve (equation [2]) and $E$ is the initial equilibrium of equations (1) and (2). $CF$ is a rectangular hyperbola passing through $E$ and thus is a locus of points where $S_L/S_k$ is constant. The reason for omitting the demand function from Figure 1 will shortly become clear.

The observations on $X$ and $P$ are compatible only with a movement in the supply curve to the right ($SS^1$) regardless of the positions of the old and new demand curves. Constant factor shares indicate that $H$ is the new equilibrium. On the other hand the demand curve could have shifted to the right (Hicksian labor-saving technological change [9, pp. 121–22]), shifted

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[3] I shall omit the random term in the stochastic equations throughout this paper.

to the left (Hicksian capital-saving technological change), or remained unchanged (Hicksian neutral technological change). In the latter case, the demand curve would be $CF$ and would further imply that the elasticity of substitution between $K$ and $L$ $(\sigma)$ was both constant and equal to unity.

In short the supply function (2) is identified while the demand curve (1) is not. There is an infinite number of demand curves which will pass through the equilibrium points $E$ and $H$.

The above discussion illustrates the restrictive nature of Hicksian-neutral technological change.[4] Since it is only one possible situation, the reader can appreciate the necessity of developing a production function other than the Cobb-Douglas function. Only if $\sigma$ is allowed to take on values other than unity can an unbiased test of the direction of technological change be undertaken.

The studies of Brown and DeCani and David and van de Klundert both employ the C.E.S. production function to derive the demand function for $X$. Unfortunately by taking factor prices as given, Brown and DeCani [3, p. 293] ignored the supply function for $X$. Thus one is not sure whether they estimated a demand function, a supply function, or a "mongrel" [13, pp. 147–50]. David and van de Klundert [5, p. 366] readily admit that their analysis of the direction of technological change is subject to a simultaneous-equation bias.

The dimension of the bias contained in the results of the above two studies is unknown. It is possible that the bias is not even significant. If this were the case, however, the results of the two studies might not be contradictory. Brown and DeCani found that technological change had raised the efficiency of capital relative to labor. On the other hand, David and van de Klundert [5, pp. 380–81] reached the opposite conclusion.[5] It seems that a further analysis is required to resolve this question.

To avoid the simultaneous-equation bias, I will derive a model of the demand for and supply of $K$ and $L$ and apply suitable simultaneous estimation techniques.

The following demand function for $X$ can be derived from the C.E.S. production function with all technological change augmenting $K$ and $L$ [5, pp. 361–77]:

$$(3) \qquad \ln (X)_t = \lambda(\sigma - 1) \ln \left(\frac{e}{f}\right)_0 - \lambda\sigma \ln (P)_t + \lambda a(\sigma - 1)t$$
$$+ (1 - \lambda) \ln (X)_{t-1} + \lambda g \ln (1 - u)_t$$

where $\sigma$ is the elasticity of substitution, $a$ is the rate of change of the aug-

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[4] This is the significance of Solow's [16, p. 312] assumption of neutral technological change in that if valid it would enable him to identify the parameters of his production function. The evidence which he advanced in support of this assumption [16, p. 316] was insufficient in that it ignored price-induced substitution from the supply side [18, p. 413].

[5] There is some difficulty in comparing the two studies in that Brown and De Cani [3] compare different periods to determine the direction of technological change while David and van de Klundert [5] estimate the annual rate of change of the ratio of capital to labor efficiency for the complete time period (1899–1960).

mentation of $K$ relative to $N$, and $\lambda$ is the elasticity of adjustment of actual $X$ to desired $X$. The unemployment rate $(u)$ serves the dual function in the David and van de Klundert model of adjusting $K$ for unutilized capacity and allowing for deviations between actual $P$ and expected $P$.

The supply of $K$ and $N$ may be considered a function of $P$ and real per capita income $(Y)$:

$$(4) \qquad \ln (X)_t = \ln d_0 + d_1 \ln (P)_t \div d_2 \ln (Y)_t.$$

The supply function in my model serves to identify (3) and for this purpose it is sufficient that $d_2$ be significant.

Estimation of the demand function by either indirect least-squares (reduced forms) or two-stage least-squares (2SLS) will give the same results. The supply function is overidentified and may be estimated by 2SLS. The resulting estimates are:[6]

$$(5) \qquad \ln (X)_t = 3.11 - 0.34 \ln (P)_t + 0.002(t) + 0.29 \ln (X)_{t-1}$$
$$\quad (0.11) \qquad\quad (0.0001) \quad (0.13)$$
$$\quad - 0.13 \ln (1 - u)_t$$
$$\quad (0.20)$$
$$\quad R^2 = .98 \qquad \text{D.W.} = 1.23$$

$$(6) \qquad \ln (X)_t = 14.59 - 0.63 \ln (P)_t + 0.07 \ln (Y)_t$$
$$\quad (0.02) \qquad\quad (0.02)$$
$$\quad R^2 = .97 \qquad \text{D.W.} = 1.37,$$

and $\hat{\sigma} = .425$ and $\hat{a} = -.44$ per cent. The single-equation estimate of the demand function by David and van de Klundert [3, p. 377] has $\hat{\sigma} = .32$ and $\hat{a} = -.72$ and $g$ is significant. The lack of significance of $g$ in my simultaneous-equation model suggests that $(1-u)$ should be eliminated from the demand function:

$$(7) \qquad \ln (X)_t = 6.95 - 0.50 \ln (P)_t + 0.0015(t) + 0.14 \ln (X)_{t-1}$$
$$\quad (0.08) \qquad\quad (0.0005) \quad (0.13)$$
$$\quad R^2 = .98 \qquad \text{D.W.} = 1.21$$

$$(8) \qquad \ln (X)_t = 14.63 - 0.63 \ln (P)_t + 0.06 \ln (Y)_t$$
$$\quad (0.02) \qquad\quad (0.02)$$
$$\quad R^2 = .98 \qquad \text{D.W.} = 1.12,$$

and $\hat{\sigma} = .50$ and $\hat{a} = -.30$. With the elimination of $(1-u)$, $\lambda$ is not significantly different from unity. David and van de Klundert estimated $\lambda = .28$.

[6] The standard errors are in parentheses below the estimates. $R^2$ is adjusted for degrees of freedom and D. W. is the Durbin-Watson statistic.

With all adjustment of $X$ taking place in one year, $X_{t-1}$ can be eliminated from the demand function:

$$(9) \qquad \ln (X)t = 9.31 - 0.57 \ln (P)_t + 0.0019(t)$$
$$(0.02) \qquad (0.0006)$$
$$R^2 = .98 \qquad \text{D.W.} = .80$$

$$(10) \qquad \ln (X)_t = 15.24 - 0.63 \ln (P)_t + 0.07 \ln (Y)_t$$
$$(0.02) \qquad (0.02)$$
$$R^2 = .98 \qquad \text{D.W.} = .80$$

and $\hat{\sigma} = .57$ and $\lambda = -.43$ per cent.

The estimates of the parameters of the supply function are unaffected by the several transformations of the demand function. Unfortunately the estimate of the price elasticity of factor supply has a negative sign. This implies that the relative supply of capital and labor function in Figure 1 has a negative slope.

The supply function given by equation (4) appears to be inadequate for our purposes. The basic problem is a failure to distinguish between two decision-making units: households and the capital goods industries.[7] An improved model can be arrived at by specifying a separate supply function for labor and capital goods.

The participation of the population in the labor force will be determined by the real wage rate and the probability of obtaining employment [19] [14] [2]:

$$(11) \qquad \frac{L_t}{D_t} = f(W_t, (1 - u)_t)$$

where $D_t$ is total population and $L_t$, $W_t$ and $U_t$ are defined as before. If the function, $f$, can be approximated by a double-log function, equation (11) may be rewritten as:

$$(12) \qquad \ln L_t = \ln b_0 + b_1 \ln (1 - U)_t + b_2 \ln W_t + b_3 \ln D_t.$$

The supply function for new capital goods may be derived by combining a cost function for a given capacity with a shift variable to represent the changing capacity of the capital goods sector. Let total cost of producing capital goods be a linear logarithmic function, $h$, of output:[8]

$$(13) \qquad C_k = h(K),$$

where $C_k$ is total cost of producing $K$.

The short-run equilibrium supply of capital goods, $K^*$, is obtained by dif-

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[7] This was pointed out to me by Lawrence Klein.

[8] This form of the total cost function has been employed by several authors and is easily derived from the C.E.S. production function [21, p. 45].

ferentiating equation (13) with respect to $K$ and setting the resulting equal to the real price of capital. Thus

(14) $$\ln K^* = \ln C_1 + C_2 \ln P_k.$$

The short-run equilibrium supply of capital goods, $K^*$, is related to the actual supply of capital goods by the capacity of the capital goods sector:

(15) $$\ln (Ks) = \ln C_0 + C_1 \ln P_k + C_2 \ln KK,$$

where $KK$ is the real capital stock of the capital goods sector (see Appendix A).

Each of the equations in my model are overidentified and have been estimated by means of 2SLS (with $t$, $X_{t-1}$, $D_t$, and $KK_t$ treated as predetermined variables):

(16) $$\ln (X)_t = -7.26 + 0.81 \ln (P)_t + 0.008(t)$$
$$\quad\quad (4.79)\ (0.32)\quad\quad\quad (0.002)$$
$$\quad + 1.07 \ln (X)_{t-1} - 1.69 \ln (1 - u)_t$$
$$\quad\quad (0.23)\quad\quad\quad (0.47)$$
$$\quad R^2 = .95 \quad\quad \text{D.W.} = 0.91$$

(17) $$\ln (X)_t = 7.59 - 0.27 \ln (P)_t + 0.0014(t)$$
$$\quad\quad (2.65)\ (0.11)\quad\quad\quad (0.0007)$$
$$\quad + 0.46 \ln (X)_{t-1}$$
$$\quad\quad (0.17)$$
$$\quad R^2 = .94 \quad\quad \text{D.W.} = 1.09$$

(18) $$\ln (Ks)_t = -0.61 + 0.87 \ln (P_k)_t - 0.14 \ln (KK)_t$$
$$\quad\quad (1.30)\ (0.22)\quad\quad\quad (0.12)$$
$$\quad R^2 = .24 \quad\quad \text{D.W.} = .77$$

(19) $$\ln (L)_t = -7.68 + 0.59 \ln (W)_t + 1.59 \ln (1 - u)_t$$
$$\quad\quad (0.51)\ (0.05)\quad\quad\quad (0.08)$$
$$\quad + 1.27 \ln (D)_t$$
$$\quad\quad (0.09)$$
$$\quad R^2 = .99 \quad\quad \text{D.W.} = .96$$

The presence of the variable $(1-u)$ in the demand function (equation 16) is once again a source of difficulty. The coefficient on $P$ has the wrong sign and the adjustment process of actual $X$ to desired $X$ is explosive since the adjustment coefficient is greater than unity.

$(1-u)$ is included in the derived demand function for $X$ to adjust the capital stock for variations in the utilization of capacity [5, pp. 375–75). Nerlove contends that "it may be unwise to attempt a direct adjustment of the measured levels of inputs" [15, p. 232]. Rather a distributed lag relation between the input levels and output can be introduced into the derived factor demand relations to allow simultaneously for variations in the utilization of *both* $K$ and $L$ [15, pp. 234–39].

Equation (17) is the estimate of our derived demand function for $X$ when the direct adjustment for capital utilization is eliminated. The distributed lag relation between actual $X$ and equilibrium or desired $X$ thus remains to allow simultaneously for the adjustment of both $K$ and $L$. The resulting estimates of the parameters of the model are theoretically plausible:

$$\hat{\lambda} = 0.54$$
$$\hat{\sigma} = 0.50$$
$$\hat{a} = -0.51$$

The single-equation estimates of David and van de Klundert [5, p. 377] are:

$$\hat{\sigma} = 0.32$$
$$\hat{a} = -0.72$$
$$\hat{\lambda} = 0.27$$

Thus my simultaneous-equation model indicates a higher elasticity of substitution, a lower bias in the rate of efficiency growth of labor relative to capital, and a faster adjustment of actual $X$ to the desired $X$.

All parameters in the supply of labor equation (19) are significant and possess the expected signs. A given reduction in the unemployment rate induces a more than proportional increase in the participation of the population in the labor force.

The supply of capital goods equation (18) is distinguished by one insignificant predicator. Poor data and inadequate theory of the relation between cost of adjustment and supply are the obvious culprits.

My model continues to be plagued by the presence of autocorrelated residuals.[9] All of the usual techniques employed to correct for autocorrelation assume the absence of additional econometric problems such as simultaneous-equation bias. Thus I shall not pursue this matter further at this time.

                                                              MAURICE WILKINSON*

[9] The Durbin-Watson (D.W.) statistic is biased toward $2T/T-1$ (where $T$ is the number of observations) when the equation contains the lagged value of the dependent variable. Even so, positive autocorrelation is clearly present.

## APPENDIX A: THE STATISTICAL SERIES

1. ($K$) Unweighted real capital input in the U. S. private domestic economy [10, Table A-XV] (in millions of 1929 dollars).
2. ($N$) Unweighted input of labor in U. S. private domestic economy [10, Table A-X] in millions of manhours.
3. ($Q$) Net private domestic product [10, Table A-III, col. (5)–(2)–(6)]) in millions of 1929 dollars.
4. ($S_L$) Share of labor in net income originating in the total private domestic economy. From 1899–1929, this data was taken from A. Grant [8, Table 4, col. 2, p. 279]. From 1929–1953, U. S. Department of Commerce, Office of Business Economics [20, Table I-12, p. 134]. The denominator is gross business product minus the sum of indirect taxes and capital consumption allowances. The numerator is the sum of employee compensation in incorporated, unincorporated and government enterprises. No attempt was made to allocate entrepreneurial income between capital and labor. A net factor share concept was employed rather than the gross concept adopted by David and van de Klundert [5, pp. 391–92] because this is the concept required in an aggregate production function. The latter makes no provision for depreciation in its usual formulation [16, p. 314].
5. ($S_K$) Share of capital in net income originating in the total private economy $(1-S_L)$.
6. ($W$) The price of labor $(S_L Q/L)$.
7. ($P_K$) The price of capital $(S_K Q/K)$. $P_K$ is the price or return to capital after allowing for depreciation since $S_L$ and $S_K$ were calculated on the basis of net private domestic product.
8. ($Y$) Real per capita net domestic product. This series was calculated on the basis of Kendrick's estimates of net domestic product [10, Table A-III, column (3)].
9. ($KK$) The real capital stock of the capital goods sector. Calculated from selected observations of the total capital stock by major and minor manufacturing industries [4, Table A-8, pp. 241–47] and interpolated by means of annual observations on expenditures for new plant and equipment [4, Table C-3, p. 334].
10. ($K_s$) Gross private domestic investment [10, Table A-IIa] (in millions of 1929 dollars).

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## Earmarked Taxes and Majority Rule Budgetary Processes

Earmarking of tax revenues is a practice whose condemnation by political science and public administration theorists has been joined in almost universally by economists.[1] Either explicitly or implicitly, the criticisms of earmark-

[1] Examples of the "standard" criticisms are cited by J. M. Buchanan [2, p. 457n]. For some recent empirical observations, see E. Deran [4].

ing usually arise out of the analogy with consumer demand theory where the imposition of additional constraints frequently produces an inferior budgetary choice. J. M. Buchanan [2] has recently pointed out the inappropriateness of the consumer demand analogy in the analysis of group choice. Arguing that budgeting practices must be analyzed as alternative modes of resolving the conflicts between divergent individual budgetary preferences, he provides an analysis which depicts earmarking as actually superior to general funds budgeting in certain respects.

This paper adopts Buchanan's important methodological advance wherein a group rather than an individual decision model is employed. It also confirms his conclusion that earmarking is not necessarily an inadvisable practice. However, by relaxing Buchanan's simplifying assumptions, the analysis presented here suggests that his original model (1) depends on a peculiarity of the individual preference functions and (2) introduces what may be regarded as a "bias" in the normative implications. An alternative rationale for earmarking is developed within a modified model where, however, the normative conclusions about earmarking become less determinate.

## I. *The Buchanan Argument*

The essence of Buchanan's argument is that earmarking provides a means of adjusting both the size and the composition of public expenditure via a separate cost-benefit calculus for each public good. By contrast, general fund budgeting permits an individual decisionmaker, whether citizen or legislator, to "vote" only on the aggregate outlay for "bundles" of public services whose composition is predetermined by the budgetary authority. Thus, the general fund case is represented as an analogue to the private-sector practice of "tie-in sales" where sale units consisting of heterogeneous products are employed to extract part of the buyer's "consumer surplus" by forcing him into an "all-or-nothing" type of choice.

Among the basic assumptions of the supporting analysis are the following:

1. The ratio allocating any general fund budget between the public goods in Buchanan's simple two-good model is predetermined by a "budgetary authority."

2. For both the general fund and earmarking cases, the distribution of taxes and, hence, the marginal tax-prices of public goods to each individual have been determined outside the model.

3. There exists one voter-taxpayer-beneficiary possessing a median set of preferences about each expenditure decision to be considered. This convention of selecting a voter-taxpayer-beneficiary with a median set of preferences is applied in order to concentrate attention on what is in effect the determining decision-making element in the group.[2]

A relatively simple pair of cost-benefit models embodying, in turn, the general

[2] If preferences among the outcomes meet the condition of "single-peakedness," the median individual becomes decisive in simple majority-rule models. See Duncan Black [1]. The limitations of this "median man" convention as applied to government budgeting analysis are discussed below.

fund and earmarking budgetary institutions is then employed to analyze the alternative outcomes as reflected in the pivotal median individual's choice calculus.

Given an understanding of the basic premises, it is unnecessary to repeat the details of Buchanan's analysis. It should be obvious that a pivotal individual, who by assumption casts the decisive vote for all budgeting decisions within the earmarked system, will regard the fixed general-fund mix of expenditures as an additional constraint on his previously unconstrained choice. This additional constraint therefore normally forces him into an inferior budgetary decision. As Buchanan points out, there is but one special case when the additional constraint becomes, in effect, inoperative: when the general fund ratio between the public goods happens to be the same as the ratio which would be freely chosen under the earmarking scheme. "Tie-ins" linking the expansion of one good to that of another may thus have the effect of distorting the collective decision.

Within its framework as set out above, Buchanan's line of reasoning does not seem subject to serious exception. This paper indicates some important aspects of the problem which change when the key assumptions cited above are relaxed.

## II. *Analysis of Assumptions*

An initial question may be raised concerning the assumed predetermination of the general funds expenditure allocation by a governmental authority which apparently is unresponsive to individual preferences exerted via the voting process. If the "median voter" successfully imposes his preference in the (legislative) budget-size decision, should his influence over the (executive-bureaucratic) budget decision be less? And since the median voter's preferences do govern in the legislative assembly, what circumstances render the legislature incapable of modifying unsuitable budget guidelines formulated by the bureaucracy? Buchanan's brief footnoted allusion to such factors is, unfortunately, somewhat cryptic.[3] Moreover, it is essential that this line of objection be met since only imperfect response can explain why the general funds budgetary composition would diverge from the special case wherein the earmarking and general funds results coincide.

Lack of political responsiveness on the budgetary composition decision may or may not be a realistic hypothesis. Since, however, a modified model can establish a rationale for earmarking even in the absence of bureaucratic unresponsiveness, the analysis developed below employs the weaker assumption that the same decisionmakers determine both the budget mix and the budget size. Not only does this make any general funds "inefficiency" completely en-

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[3] Buchanan [2, p. 459n]. "Control over the budgetary allocation, at one stage removed, does exist through the voter's ultimate power to remove public officials through electoral processes. And, even for the budgetary allocation as presented, legislative power to modify the allocation of funds among the separate public service outlays is normally exercised. However, these powers to change the uses to which general-fund revenues may be put do not modify the basic "tie-in" features of the model until and unless the tax structure is simultaneously considered in the same decision process."

dogenous, but it also adopts what some will prefer as a closer approximation to real-world decision-making conditions.

The second assumption to be relaxed is that of exogenous determination of the tax system. In the original Buchanan model this assumption merely rendered the analysis less complex. Elimination of assumptions (1) and (3) above makes variation of the tax system a pivotal point in the alternative model which this paper presents.

Finally, relaxation of the "median voter" convention is perhaps the most important step to be taken. Applied to a multidimensional series of decisions, this device is a much more restrictive one than is immediately evident, since it assumes that the *same* voter has the median preference in *all* of the relevant dimensions of budgetary adjustment. The small likelihood of this condition actually being met is better appreciated if the various dimensions of budgetary adjustment are explicitly enumerated. The set of suboptimization decisions includes:

1. *Choice among general fund alternatives:* (a) The *composition* of the general funds budget for any given budget size; (b) The *size* of the general funds budget, given the composition and the tax costs to each voter; and (c) The *tax distribution* used to finance alternative sizes of general funds budgets.

2. *Choice among earmarking alternatives:* (a) The *levels* of provision for each good provided through earmarking, given the earmarked financing method for each good. (b) The *earmarked taxes* for each good provided via earmarking.

3. *The institutional choice between earmarking and general funds budgetary procedures.*

Buchanan's model excludes 1(c) and 2(b) above since the taxes are determined exogenously. The neatness of his conclusion, however, depends on the important implicit assumption that the representative individual being examined has the median preference—and therefore casts the controlling vote—for *all* movements in the remaining dimensions 1(a), 1(b), 2(a), and 3. Satisfaction of this condition imposes extremely strong restrictions on the set of individual preference functions in the collectivity.

What difference does it make if, in fact, there exists no reference individual who possesses the median preference in each of the listed dimensions? In a model with a universally pivotal voter such as Buchanan's median man, any departure from the adjustment attained under unconstrained voting is necessarily a movement away from the perfect personal optimum which the pivotal reference voter could otherwise select. By contrast, the absence of an individual who is decisive in each budgetary dimension implies that there does not exist *any* reference individual who will achieve his full optimum when the collective decision-making process operates in unconstrained fashion. In the latter case, while the imposition of a new constraint (such as one on the budgetary mix) will normally "distort" the original result, it becomes impossible to say whether this "distortion" moves the solution toward or away from any particular individual's budgetary optimum.[4] This is an important qualification of the

[4] This observation has a basis parallel to the "Second Best" theorem of K. Lancaster and R. Lipsey [6].

Buchanan model in that it removes any presumption that the elimination of constraints, exogenous or otherwise, makes the choice process more "efficient."[5]

### III. *An Alternative Analysis*

This section develops an earmarking rationale on grounds which are independent of those assumed by Buchanan. Thus, the present approach may be regarded either as a supplement to or as an alternative for his original model, depending on one's assessment of the limitations outlined above.

The simplest model appropriate for the analysis is one which permits an expenditure choice between two public goods, $X_1$ and $X_2$, and a financing choice between two tax systems, $T_1$ and $T_2$. These variables may be thought of as pairs of single goods and single taxes, respectively, or as composite goods and composite financing media defined with reference to specified "mixes." For simplicity, the prices of $X_1$ and $X_2$ are assumed to be equal and also identical with the amount of revenue provided via unit increments in either tax system $T_1$ or $T_2$. The analysis is framed in terms of a particular incremental adjustment of the public budget, but the principles involved can be applied to discrete changes. Following Buchanan, it is further assumed that income effects do not modify individual evaluations of the alternative expenditures and taxes.[6] Members of

TABLE 1—INCREMENTAL EVALUATIONS OF EXPENDITURE AND TAX INCREASES

| Preference I | | Preference II | | Preference III | |
|---|---|---|---|---|---|
| $X_1$ | +6 | $X_1$ | +4 | $X_1$ | +14 |
| $X_2$ | +12 | $X_2$ | +3 | $X_2$ | +12 |
| $T_1$ | −4 | $T_1$ | −5 | $T_1$ | −16 |
| $T_2$ | −7 | $T_2$ | −6 | $T_2$ | −4 |

the decision-making group are represented by three different preference systems. These preferences may be interpreted as corresponding to three single individuals or to three homogeneous groups of equal size.

Table 1 lists incremental evaluations of the expenditures and taxes for each of the three preferences in the group. The decision matrices of Table 2 include all possible tax-and-expenditure decisions achievable via the incremental moves described. For expository convenience, particularly in the discussion of uncertainty below, the index of preference may be regarded as a cardinal one. However, it is only the *ordinal* relationships of Table 2 which are really necessary for the basic effects described.

[5] Buchanan's identification of earmarking as more "efficient" for the reference individual is perhaps open to misinterpretation. His usage does not imply "betterness" in the sense of increased "social welfare." An interpretation of this type would be at variance with Buchanan's individualist-positivist methodological position. The real contribution of his analysis is a rationale for the widespread use of what many reject as an inefficient practice.

[6] Although reasonably realistic for small changes, this assumption is strictly a device to avoid the clumsiness of providing different sets of illustrative evaluations for each change in the accompanying decision variables.

The *status quo* involves the choice of the purely symbolic "non-expenditure" and "non-tax" variables $X_0$ and $T_0$. Bracketed elements in the matrices are excluded as possible decisions on either of two grounds: (1) tax increases without accompanying expenditures (i.e., $X_0T_1$ and $X_0T_2$) would unanimously be ranked lower than the option of no change at all, represented by $X_0T_0$; (2) expenditure increases without tax increases (i.e., $X_1T_0$ and $X_2T_0$) are economically inconsistent with the requirement of budget balance.

In analyzing budgetary decisions within this framework, a key point is that general funds budgeting implies separate decisions on the expenditure allocation and the financing distribution. Although the following discussion may be reversed, the tax decision will be treated as always coming first in time.[7] Suppose, then, that a tax increment is proposed in the Table 2 situation. Movement from the status quo at $X_0T_0$ requires that a majority attribute positive value to that element of the matrix which corresponds to the (column) tax decision about to be taken and the anticipated decision on the (row) expenditure allocation to be furnished out of the new revenues.

TABLE 2—DECISION MATRICES DERIVED FROM INDIVIDUALS' PREFERENCES

| | Preference I | | | | Preference II | | | | Preference III | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $T_0$ | $T_1$ | $T_2$ | | $T_0$ | $T_1$ | $T_2$ | | $T_0$ | $T_1$ | $T_2$ |
| $X_0$ | 0 | [−4] | [−7] | $X_0$ | 0 | [−5] | [−6] | $X_0$ | 0 | [−16] | [−4] |
| $X_1$ | [+6] | +2 | −1 | $X_1$ | [+4] | −1 | −2 | $X_1$ | [+14] | −2 | +10 |
| $X_2$ | [+12] | +8 | +5 | $X_2$ | [+3] | −2 | −3 | $X_2$ | [+12] | −4 | +8 |

If additional taxes are to be raised for a budgetary increment, the preferences of the voters between $T_1$ and $T_2$ are independent of the expected decision about expenditure composition. Thus, the majority prefers $T_1$ over $T_2$ regardless of the matrix row. Nevertheless, no tax at all (i.e., $T_0$) will be chosen unless the value of the expected expenditure allocation exceeds the tax costs. Hence a voter's tax preferences are *not* independent of the expected expenditure pattern.

This can be illustrated via the Table 2 situation. If the members of the group have reasonable knowledge about other voters' ordinal preferences between alternative expenditure compositions, an individual contemplating his tax decision will expect the $X_1$ pattern to be purchased out of any revenue increment since $X_1$ ranks highest for a majority. The majority tax preference $T_1$ would therefore lead to decision $X_1T_1$, which involves a negative payoff for a majority. Nor is it possible for one of the majority tax preferences (I and II) to gain a positive payoff for a majority by a compromise vote in favor of $T_2$, since $X_1T_2$

[7] Decisions in each separate dimension depend only on the ordinal preferences in that dimension. Hence, no matter whether taxes or expenditures are determined first, precisely the same pair of subdecisions will determine the the overall budget decision in which we are interested.

is still negative for two persons. So long as $X_1$ is the expected expenditure, therefore, the majority will choose $T_0$ and reject any budget expansion.

A key to the use of earmarking is suggested if we observe that a positive payoff *does* exist for a majority (I and III) at $X_2T_2$. Why are these majority gains not exploitable under general funds budgeting? The answer is that an analogue to the Prisoner's Dilemma prevents Preference I from voting with Preference III for tax $T_2$ in exchange for III's voting with I on the expenditure choice of $X_2$. The dilemma is that Preference III may be expected to renege on his part of his logrolling operation since, once the tax column is fixed, III's gains are always maximized by choosing the $X_1$ row in alliance with Preference II. What is required here is an enforcement mechanism to insure a Preference I voter that his attempt at cooperation will not result in III's chiselling and the negative payoff $X_1T_2$ in lieu of the gains achievable at $X_2T_2$.

A binding exchange of proxies would, for instance, permit the necessary cross-dimensional trade of votes between I and III. However, explicit vote-trading frequently appears to be regarded as impractical either because it is costly, time-consuming, or not sanctioned by some persons. In these cases, despite the existence of potential majority gains, the budgetary process becomes "stuck" at the status quo unless an alternative trading mechanism can be used.

Clearly, any impasse resulting from general funds budgeting in the Table 2 situation is avoidable if integrated budgetary decisions are substituted for the fragmented suboptimization process. If the tax and expenditure mixes are determined jointly, the coalition between I and III can be *enforced* by earmarking tax $T_2$ for use on expenditure $X_2$. While the enforcement problem was not dealt with explicitly by Wicksell, earmarking is obviously closely related to his suggested simultaneous detemination of taxes and expenditures [10].

Coalition solution $X_2T_2$ is not, of course, necessarily a stable result. For instance, II should be willing to minimize losses by joining a counter-coalition for either I's maximum at $X_2T_1$ or III's maximum at $X_1T_2$, giving rise to the possibility of majority cycles. No attempt to deal with the $n$-person game-theoretic implications will be undertaken here. This paper purports to show only that circumstances exist where earmarking actually increases the achievable range of solutions for the group.

The "efficiency" of earmarking as a practice is then most easily evaluated if one imagines the illustrative group to be confronted by the choice between a budgetary constitution which permits earmarking and an alternative decision rule which prohibits it.[8] If the rule is considered one for a one-shot budgeting "game" with payoff matrices similar to those of Table 2, a Preference II voter should always seek to prohibit earmarking since it implies potential losses. For this reason, earmarking cannot qualify as a welfare improvement in the sense of a Pareto-move. By contrast, either I or III can insure themselves against losses by joining with II to constitute a majority for prohibition of earmarking. If they do *not* do so, the implication is that the expected value of the

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[8] This is by no means a purely academic question. Constitutional prohibitions against earmarking are frequently advocated. For instance, see [7] and [8].

earmarking result is positive for each of them and, hence, preferable to the zero payoff from general funds budgetary adjustments. The illustrative data may be used as a case in point. Based on Table 2, the expected value of the solution is positive for both I and III if each result is regarded as equally probable.

Changing the context to a multi-trial game where the Table 2 matrix is only the current state of a varying payoff function, the earmarking scheme may actually win unanimous support and meet the Paretian welfare criterion. This would occur if, for instance, the passage of time shuffles the identities of relatively intense "winners" and relatively indifferent "losers" in a fashion which is sufficiently random for the distributional aspects to wash out. Again, Table 2 may be used as an illustration. If future circumstance were expected to assign the I, II, and III-type payoff matrices randomly on future budgetary "plays," the "game" can be converted to one with positive payoffs for each participant when earmarking is permitted. If earmarking increases net gains to the group at each point in time, it would then become the more efficient means of maximizing each individual's long-run gains from operation of the public budget.[9]

Modification of this model to allow a high degree of uncertainty about the preferences of other voters cuts two ways. On the one hand, earmarking may become more appealing because it can eliminate the uncertainty of the tax decisionmaker about the subsequent disposition of the funds he contemplates making available. On the other hand, the resultant fixity of the expenditure pattern makes it more difficult to readjust if the economic conditions foreseen at the time of the original earmarking "contract" alter. This problem of erroneous expectations is, however, common to any type of agreement which must be discharged in the future.

Thus, while the consequences of permitting earmarking are dependent on a host of empirical factors, it is possible to indicate circumstances where the general funds method of adjustment may actually be inferior, either for a majority of the group or even by unanimity. There is certainly no a priori reason for economists to reject earmarking out-of-hand as an "inefficient" device within the context of a majority-rule decision process.

## IV. *Conclusions*

This paper suggests an alternative or supplement to Buchanan's explanation of earmarking. Under certain conditions, the only possible budgetary adjustments which yield majority gains may require logrolling between members of the majority coalition on tax adjustment. General funds budgeting is a suboptimization process wherein incentive to chisel and lack of enforceability render cooperation between factions unlikely. By contrast, earmarking provides an enforceable "tie-in" between the tax concessions and expenditure concessions necessary to achieve a majority gain under certain circumstances.

[9] This possibility that distributional effects will wash out in the long run merely re-echoes a point made by many in the welfare economics debate between the actual compensationists and the hypothetical compensationists. See, for instance. J. R. Hicks [5, p. 111]. Of more direct relevance to the distinction between Pareto-optimal rules and Pareto-optimal outcome is Buchanan's essay on the relevance of Pareto optimality [3].

This theory is consistent with the "benefits" character of most earmarked taxes since concession of an expenditure adjustment in favor of a particular interest group might be expected to be "paid for" by concession of a tax adjustment against that group.[10] Earmarking of gasoline taxes for highway expenditures is one of the abundant and relatively obvious examples which meet these conditions. The link between the tax preference and the expenditure preference need not be so direct, however. For instance, advocates of a progressive income tax and higher educational expenditures might logroll with advocates of a sales tax and higher welfare expenditures. The outcome could then be either a sales tax largely earmarked for education or an income tax largely earmarked for welfare expenditures.

The welfare implications of this analysis should be interpreted with extreme caution. Nevertheless, earmarking can be recognized as a perfectly rational strategic tool for majority coalitions, a conclusion sufficient to explain its frequent empirical practice. Earmarking may even meet the Paretian welfare criteria if it is evaluated as a long-run process. Of course, the logrolling rationale outlined above applies only to the extent that strategic dilemmas of the type described are empirically probable descriptions of the conflicts between legislative interest groups.

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[10] A description of the characteristics of earmarked state taxes in the United States during fiscal 1963 can be found in the Tax Foundation's latest study of earmarking [9].

## A Note on the Equivalence of Tariffs and Quotas

In his recent article on the equivalence of tariffs and quotas [1], Jagdish Bhagwati argued that the equivalence—defined "in the sense that a tariff rate will produce an import level which, if alternatively set as a quota, will produce an identical discrepancy between foreign and domestic prices [implicit tariff]" [1, p. 53]—followed from the universal assumption of competition, namely (a) competitive foreign supply, (b) perfect competition in domestic production, and (c) a quota which was allocated so as to ensure perfect competition among the quota holders, and that this equivalence generally broke down with the introduction of monopoly elements into any one or more of these listed areas.[1]

He then examined some of the implications of the nonequivalence proposition, including problems such as the protective effect of tariffs when combined with quotas (when, despite the implicit tariff being greater than the explicit tariff, it was shown that there could be a net protective effect from the presence of the explicit tariff whereas traditional analysis in terms of the equivalence proposition would declare the explicit tariff to be redundant in this case). But, while Bhagwati's definition of equivalence is adequate for the purposes to which it has been put by him, it is not readily and always useful if one's primary interest is in determining whether tariffs and quotas lead to equivalent protective effects, either in terms of reducing imports or with respect to their effect on domestic importable production.

It thus turns out that, while tariffs and quotas are not equivalent sometimes in Bhagwati's sense, they are equivalent in terms of giving rise to identical protective effect, although the breakdown of equivalence in one sense implies breakdown of equivalence in the other sense in most cases. In the following, I shall attempt, first, to set out a concrete case of such a conflict of results pertaining to equivalence, and by so doing I hope to supplement Bhagwati's article, since this attempt involves an analysis of a case which he left specifically unexamined, namely the one involving monopolistic sale from foreign sources [1, p. 54]. Secondly, I shall try to shed some light on the significance of the equivalence of tariffs and quotas in their protective effects with monopolistic supply from abroad, in the development of practical commercial policies by analyzing the so-called "Voluntary Export Restrictions."

### I. The Equivalence of Tariffs and Quotas Under Monopolistic Foreign Supply

Suppose that our primary interest is in the protective effect of tariffs and quotas, then what really matters is whether the prevailing domestic prices of the importing country are the same or different, when a given level of imports is produced by means of a tariff or alternatively by a quota. If the prevailing

[1] He did not, however, analyze specifically any case involving the introduction of monopoly element into the first area, namely a case involving monopolistic sale from foreign sources, stating that "this may well be an important possibility, but the analysis could easily be extended to cover it, if considered desirable . . ." [1, p. 54].

domestic prices are the same, a tariff and a quota which produce an identical level of imports are considered equivalent, and, if not, they are not equal.

Having thus restated the meaning of equivalence, we now show that the introduction of a monopoly element into the foreign supply does not create different domestic prices whether a given import level is permitted by a tariff or by a quota. We use the same analytical apparatus and notations employed in Bhagwati's original article, except two additional notations; namely $D_F$ and $R$. $D_F$ represents net domestic demand for the commodity in question, available to the foreign suppliers and $R$, tariff revenue of the importing country.

Assuming monopolistic sale from foreign sources, perfect competition in domestic market, and perfect competition among quota holders, the model for the case when a tariff, rather than a quota, is imposed is given as follows:

$$(1) \qquad\qquad S_D = S_D(P_D)$$

$$(2) \qquad\qquad D = D(P_D)$$

$$(3) \qquad\qquad D_F = D(P_D) - S_D(P_D)$$

$$(4) \qquad\qquad D_F = S_F$$

$$(5) \qquad\qquad C = C(S_F)$$

$$(6) \qquad\qquad \left(\frac{1}{1+t}\right)\frac{d(P_D S_F)}{dS_F} = \frac{dC}{dS_F}$$

$$(7) \qquad\qquad R = \left(\frac{t}{1+t}\right) P_D S_F$$

Equation (1) states that the domestic supply is a function of domestic price; equation (2) that domestic demand is a function of domestic price; equation (3) that the net demand available to the foreign monopolist is the difference between total demand and domestic supply; equation (4) that net foreign demand equals foreign supply; equation (5) that total cost of foreign production (supply) is a function of the level of production; equation (6) that marginal revenue from foreign sale is equated by the monopolist to his marginal cost; and equation (7) that tariff revenue of the importing country equals the tariff revenue per unit multiplied by the foreign supply.

We have seven equations and eight unknowns: $S_D$, $D$, $D_F$, $S_F$, $C$, $P_D$, $R$, and $t$. By choosing the tariff rate, therefore, we can determine the remaining values. Consequently, corresponding to every $t$, there will be some level of imports, $S_F$, and domestic price, $P_D$.

For a quota, the system is the following:

$$(8) \qquad\qquad S_D = S_D(P_D)$$

$$(9) \qquad\qquad D = D(P_D)$$

$$(10) \qquad\qquad D_F = D(P_D) - S_D(P_D)$$

$$(11) \qquad\qquad D_F = S_F$$

(12) $$C = C(S_F)$$

(13) $$\frac{d(P_D S_F)}{dS_F} \geqq \frac{dC}{dS_F}$$

The first five equations are already familiar. The last states the maximizing (equilibrium) condition for the monopolist when a quota is set; the equality sign holds if the monopolist sells less than the quota (i.e., the quota becomes ineffective), and the inequality if he sells the maximum amount set by the quota. There are thus six equations and six unknowns: $S_D$, $D$, $D_F$, $S_F$, $C$, and $P_D$. The import level which will maximize the foreign monopolist's profits is thus determined. This import level will, however, be subject to an upper bound set by the quota.

In the case where an effective import quota is set, the second system yields some domestic price, $P_D$, corresponding to every import level ($S_F$) chosen as the quota. At the same time, if a tariff rate ($t$) that will produce the same import level ($S_F$) is chosen, the first system must yield a domestic price, $P_D$, identical to that of the second system. In other words, so long as a tariff or a quota permits the same level of imports, the prevailing domestic price will be identical.

Figure 1 illustrates the equilibrium in the two systems. In the figure we set first a tariff rate that generates an import level; then we set the same import level as a quota and show that the same domestic price is generated but a different (and higher) c.i.f. price for the foreign monopolist prevails.

In Figure 1, the demand schedule for the foreign monopolist is $EFD$, which is obtained by subtracting the domestic supply, $S_D$, from the domestic demand, $D$. The tariff rate ($=MK/KQ$) shifts the net demand schedule for the monopolist downwards to $GH$ and his marginal revenue schedule to $GL$. Equilibrium exists where the latter cuts the marginal cost schedule for the monopolist, so that the monopolist's export ($S_F$) is at $OQ$, the domestic price is at $OA$, the monopolist's c.i.f. price is at $OB$.

We then use the same import level $OQ$ as the quota in Figure 1. The net demand schedule for the foreign monopolist is now $EMQ$ which has a kink at $M$. The corresponding marginal revenue schedule, $EI$, must become discontinuous at $I$. Equilibrium exists where the marginal cost schedule for the monopolist cuts the demand curve below $I$ so that the monopolist exports exactly the same volume set by the quota and the domestic price is at $OA$ which, in turn, becomes the monopolist's c.i.f. price. If the marginal cost schedule cuts the marginal revenue curve between $E$ and $I$, the monopolist would not use all of the quota set, and the domestic price would be higher than $OA$. However, so long as the quota is set at the same import level that will prevail under a positive tariff, the marginal cost schedule will never cut the marginal revenue schedule between $E$ and $I$, because at the monopolist's equilibrium export level reached under a positive tariff ($OQ$ in Figure 1), the monopolist's marginal cost ($QJ$) must necessarily be smaller than the monopolist's marginal revenue that would exist if there were no tariff ($QI$).

Thus we have shown that the equivalence of tariffs and quotas, as far as pro-

tective effect is concerned, does not break down with introduction of a monopoly element into the foreign supply condition. In other words, conditions of foreign supply are immaterial for the equivalence of tariffs and quotas in protective effect when perfect competition exists in domestic production and among quota holders.[2]
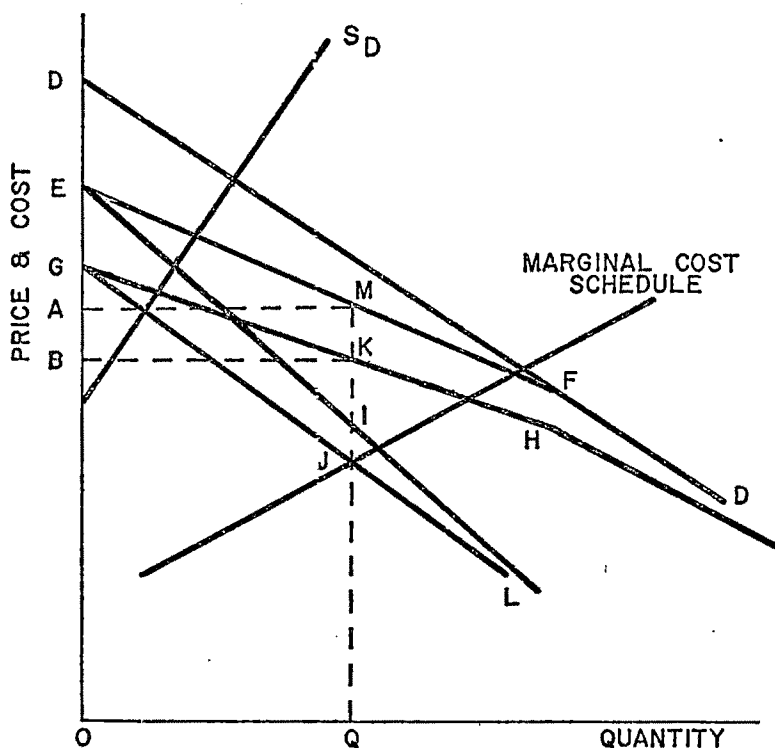


FIGURE 1

Two points are worthy of special remark. First, in a case involving monopolistic foreign supply, the implicit tariff of a quota is *always* zero, regardless of the degree of restriction on imports imposed by the quota. Secondly, the "nonequivalence" of the tariff and the quota in Bhagwati's sense persists here,[3] in spite of the fact that the quota and the tariffs are, in fact, equivalent as means of protection as well as import-restriction (except, of course, as a revenue-raising device, in which case the tariff cuts into the profits of the foreign monopo-

[2] If monopoly elements exist in both foreign and domestic supply conditions, the problem becomes one of duopoly and here there are as many cases as the behavioral assumptions we wish to make.

[3] This is clearly pointed out in the companion note of Bhagwati [2].

list and yields corresponding revenue to the government of the importing country[4]).

## II. *Implications for Commercial Policies*

The demonstration presented here is not merely interesting as a qualification added to Bhagwati's argument, but it also has important implications in analysis of a significant recent development in the area of international commercial policies, namely the so-called "Voluntary Export Restrictions." This system is currently employed by Japan, Hong Kong, and South Korea in their exports, chiefly of textile products, to the United States, Canada, and other European countries.

In the system of Voluntary Export Restrictions, in essence, the exporting and importing countries bargain bilaterally the volume of specific commodities allowed to enter the importing country usually under a threat of imminent new tariffs by the latter on the commodities in question. When they agree on the volume of imports, the importing country concedes non-use of tariffs to the exporting country in return for the latter's assurance that she will administer voluntarily the former's *de facto* import quotas thus agreed on.

From the point of view of our analysis just developed, this type of bargain seems to have its own rationality. Firstly, interests of the protectionists of the importing country chiefly lie in higher domestic prices (or protective effects) and for protection purposes quotas and tariffs are equally good. The protectionists are essentially indifferent between quotas and tariffs.[5] Secondly, the producers of exporting countries definitely prefer quotas to tariffs if some restrictions on their exports appear to be inevitable. Because under quotas, if they succeed in forming a cartel with respect to exports to the quota imposing country, they can retain a part of the revenue which would normally go to the treasury of the importing country if the restrictions were in the form of tariffs.[6] Finally, from the point of view of the governments of the importing countries, the Voluntary Export Restrictions are preferable to either forms (tariffs or quotas) of explicit import restrictions. Because of their most-favored-nation obligations to the General Agreement on Tariffs and Trade (GATT), they are usually reluctant to resort to tariffs for import restrictions. Once they give up the use of tariffs, there is no point in assuming the fruitless burden of administering quotas against imports from such countries that are willing to offer voluntary restrictions on their exports. The exporters of such countries may be able to form cartels with respect to their exports to specific countries quite

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[4] As to the significance of this nonequivalence of tariffs and quotas in revenue effect, see the second section of this note.

[5] For various administrative and political reasons firms may prefer tariffs to quotas, but where the protective effect alone is concerned, they are equivalent. See [1, p. 66].

[6] With the models we are discussing, when a tariff, $t$, is set, the profit-maximizing monopolist will set the c.i.f. price at $(1/1 + t)P_D$. Alternatively if the same import level is set as a quota, the monopolist will increase the c.i.f. price to $P_D$, since he is not required to pay any duty on its exports. In Figure 1, under the tariff, $MK/KQ$, the tariff revenue accruing to the importing country's treasury is $AMKB$, which corresponds to the amount that will be added to the monopolist's total receipts, if alternatively the quota $OQ$ is set.

easily; and thereby be in a position to counteract any monopsonistic advantages that may be expected to arise to the importing countries from administering the quotas by themselves.

HIROFUMI SHIBATA*

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# More on the Equivalence of Tariffs and Quotas

In an earlier paper on the equivalence of tariffs and quotas [1], I argued that this equivalence—defined such that a tariff would lead to a level of imports which, if alternatively set as a quota, would generate the same implicit tariff—followed from the assumptions of competitive domestic production, supply of imports, and holding of quotas. This universality of competitiveness sufficed to guarantee equivalence, as defined. It was further argued that a departure from these assumptions could, in general, destroy this equivalence and several such departures were analyzed: (1) perfect competition in domestic production replaced by pure monopoly in production; (2) perfect competition among quota-holders replaced by monopolist-holding of quota; and (3) simultaneous presence of monopoly in quota-holding and in domestic production [1, p. 54].

Recent communications, however, from Hirofumi Shibata [2] who has analyzed the case where there is monopolistic supply of imports, and from G. Yadav [3] who has analyzed the case where there is monopolistic import under both tariffs and quotas, have suggested the following clarifications and extensions of some importance.

1. The definition of equivalence, as stated above, will run into some difficulty if the tariff situation is itself characterized by a discrepancy between the c.i.f. import price and the domestic price (and hence an implicit tariff) which differs from the tariff rate. In this case, is a tariff which gives rise to an import level which, in turn, set as a quota, gives rise to an implicit tariff which is unequal to the tariff *but equal to the implicit tariff under the tariff situation itself* to be regarded as equivalent to that quota?

In the original analysis, which treated only cases where the tariff situation was characterized by a discrepancy between the c.i.f. import price and domestic price (and hence an implicit tariff) which could not depart from the explicit tariff, this question could not arise. It arises directly in the Yadav
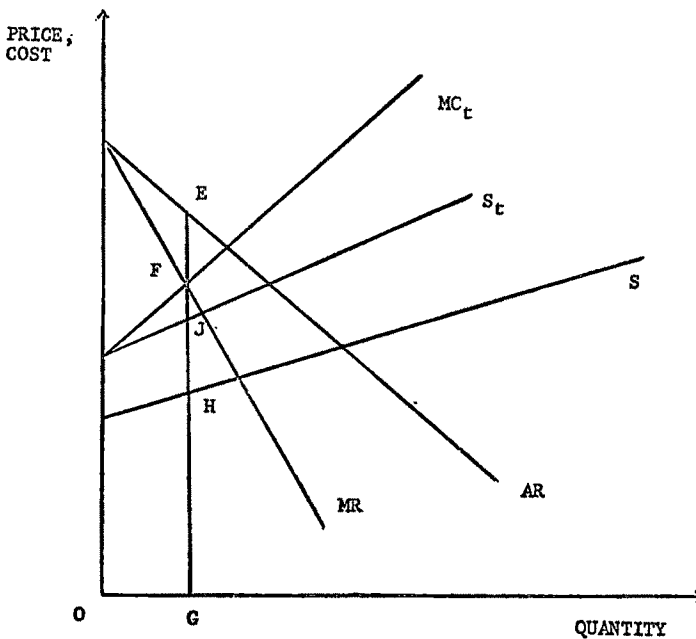
FIGURE 1

case, however, as is seen from Figure 1. Here, imports are made by a single importer, under *both* tariff and quota regimes, but competition holds everywhere else. Under tariff rate $t$, $S_t$ is the foreign supply curve of imports; without the tariff, it is $S$. $AR$ is the net demand curve for imports, the marginal revenue curve to it being $MR$. The intersection of the marginal cost curve $MC_t$, which is marginal to $S_t$, at $F$ with $MR$, determines the maximum profit position for the monopolist importer under the tariff. The domestic price is $EG$, the foreign c.i.f. price is $HG$, the landed price is $JG$ and hence the implicit tariff rate $EH/HG$ exceeds the explicit tariff rate $JH/HG$. When the quota is alternatively set at $OG$ and the (actual) tariff removed, equilibrium is again at domestic price $EG$, so that the implicit tariff rate is again $EH/HG$ but this differs from the explicit tariff rate $JH/HG$.

If, therefore, equivalence is defined in terms of the implicit tariff rate (under the quota) equalling the (explicit or actual) tariff rate, as was undoubtedly done in the original paper, we would be led to conclude that equivalence breaks down in this specific case as well. Indeed, if one takes the *pair-wise definition* of equivalence, as implicit in the original paper, that *a quota will give rise to an implicit tariff rate which, if alternatively set as a tariff, will generate the same level of imports as the quota*, it is unambiguously clear that equivalence breaks down when there is monopoly import under both tariff and quota: for, in this case, the quota $OG$ will lead to an implicit tariff rate $EH/HG$ which, when set alternatively as the tariff, will not lead to the same import level $OG$.

PRICE, COST

AR

G

MC

F

E

MR'

AR'

O          J

QUANTITY
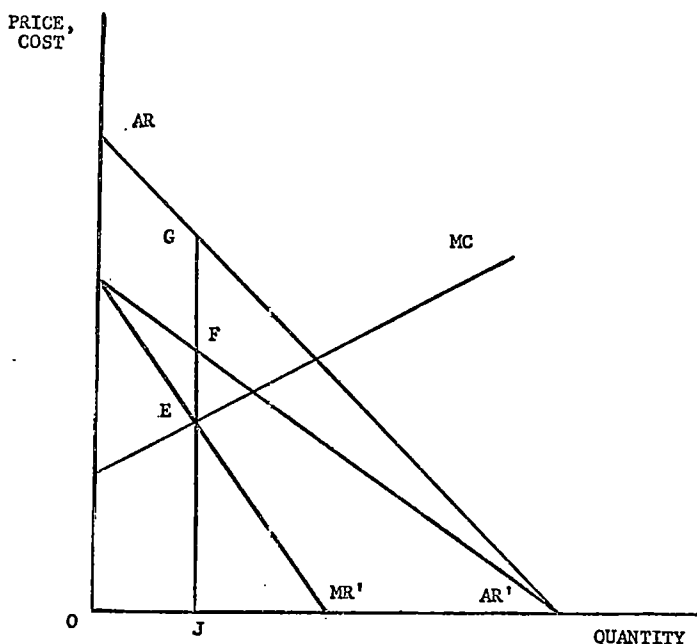
FIGURE 2

Hence, in terms of the definition of equivalence used in the original paper, the Yadav case does not represent an exception to the presumption, stated earlier, that equivalence will generally break down with the introduction of monopoly elements.

2. A similar conclusion holds for the case analyzed by Shibata, where foreign supply is monopolistic under both tariff and quota. In Figure 2 the monopolist supplier of imports is faced with the net import demand schedule $AR$ which, in case of a tariff at rate $GF/FJ$, will shift to $AR'$. The marginal revenue curve to $AR'$ is $MR'$. The intersection of the monopolist's marginal cost curve $MC$ with $MR'$ at $E$ determines his maximum-profit point, giving $OJ$ as the volume of imports, $JG$ as the domestic price, and hence $FJ$ as the c.i.f. price. The shift to the alternative situation, where the tariff $GF/FJ$ is removed and replaced by a quota of $OJ$, leads on the other hand to the same domestic price $GJ$, but the c.i.f. price now shifts also to $GJ$, so that the implicit tariff rate is zero.

The equivalence proposition thus breaks down unequivocally: an explicit tariff will not lead to an import level which, if set alternatively as a quota, will generate an implicit tariff equal to the explicit tariff; nor will a quota lead to an implicit tariff which, if set alternatively as an explicit tariff, will generate the same level of imports. Hence, the Shibata case also is no exception to the presumption that equivalence will generally break down with the introduction of monopoly elements.

3. Suppose, however, that the definition of equivalence is changed as fol-

lows: a tariff will give rise to a level of importable production and of imports which, if set alternatively as a quota, will generate the *same level of importable production*. With this definition, if the reader refers back to Figure 2, he will notice that equivalence follows except that the pair-wise criterion (that a quota will give rise to a level of importable production and an implicit tariff rate which, if set alternatively as a tariff, will generate the same level of importable production) will not yet be satisfied.[1] A similar conclusion holds for the Yadav case, as the reader can check by referring back to Figure 1.

But now follow this shift in definition to its logical end and define equivalence quite simply as follows: if a tariff leads to a specified level of imports and domestic production, there will be a specific quota which can be alternatively set which will lead to an identical level of imports and domestic production. Note that, on this definition, both the cases discussed above will go through as exceptions to the presumption that the introduction of monopoly elements will, in general, disrupt equivalence.

4. The question which immediately arises then is how equivalence should be defined. As with all definitional questions, this cannot be resolved except with reference to the kinds of questions on which light is sought by analysis deploying the chosen definition.

The advantage of the definition that was used in my original paper is that it enables one to answer directly the question whether under a quota regime the observed implicit tariff rates can be treated as equivalent to identical tariff rates (levied instead of the quota) in the sense of generating the same level of imports and domestic production. This is a question that comes up frequently and the general practice is indeed to treat the observed, implicit tariff rate under a $QR$ regime as the "effective tariff rate." It is also customary to treat a tariff as "redundant" if the implicit tariff rate, in a $QR$-plus-tariff regime, exceeds the actual tariff rate. Examination of the equivalence proposition, in terms of the original definition, throws up the limitations of these deductions when monopoly elements are present.

Thus, for example, in the case when foreign supply is monopolistic, the implicit tariff rate is zero under the quota—refer back to Figure 2—but setting the actual tariff rate at zero and removing the quota restriction will not yield the same level of imports and domestic production; the truly equivalent tariff rate is higher. Similarly, in the case where there is domestic, import monopoly instead, the truly equivalent tariff is lower than the implicit tariff rate in the quota alternative—refer back to Figure 1. Similar conclusions apply to the cases analyzed in the original paper: (i) where there is monopolistic-holding of quotas, but competition elsewhere, again the implicit tariff rate will exceed the explicit tariff rate, thus overstating the truly equivalent tariff rate, when the quota is underutilized; (ii) where there is monopoly in domestic production as well as in the holding of quotas, again the underutilization of the quota would imply an implicit tariff rate that exceeds the explicit tariff rate and hence overstate the truly equivalent, effective tariff [1, p. 63]; and (iii) where there is monopoly in domestic production but competition everywhere else, the im-

[1] On the other hand, the universally competitive system will satisfy equivalence both ways, under either definition.

plicit tariff will exceed the explicit tariff, thus overstating again the truly equivalent, effective tariff that the quota represents [1, p. 58].

Indeed, these were precisely the kinds of questions which had prompted my interest in the original analysis of the equivalence proposition. Hence my definition of equivalence in terms of the relationship between explicit and implicit tariff rates.

If, however, the analyst were interested in investigating whether the "real" equilibrium corresponding to a tariff (quota) could be reproduced exactly by *some* quota (tariff) alternatively imposed, and if this real equilibrium were taken to refer to the level of imports and importable production (which may well be the case—if the "protective" effect of trade policy were the main interest of the analyst), then the alternative definition of equivalence stated in this note, and suggested by Shibata, would be the appropriate one.

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* The author is professor of economics at the Massachusetts Institute of Technology. This note was written when he was visiting professor of economics at Columbia University. The note has been written in response to two stimulating comments from Hirofumi Shibata and Gopal Yadav of Queen's University, Kingston, on an earlier paper of the author's on this subject in the Haberler *Festschrift* volume [1].

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## On the Function of Behavioral Theory and Behavioral Research in Economics

Fritz Machlup in his 1966 Presidential Address to the American Economic Association [9] again clarified major issues relating to the respective roles of theoretical and empirical studies. Yet his analysis of the function of behavioral science in economics is far from complete and requires further clarification.

I shall recapitulate first (very briefly) the important points made by Machlup, with which at least one behavioral scientist, namely the writer, is in full agreement:

1. There is a fundamental difference between theoretical constructs and empirical or operational concepts. Only propositions regarding the latter can be verified by observation.

2. The crucial question in comparing the theory of the economic man with a behavioral theory is whether conclusions from the two theories (what Machlup calls "inferred outcomes") differ, and if so, which conclusions lead to better understanding and prediction of what has happened or will happen.

3. The major question that theory is equipped to answer concerns functional relations among variables (for instance, to cite Machlup's example, how prices of cotton textiles will be affected by an increase in wage rates).

4. Price and production theory of the firm "serves only to explain and predict effects of mass behavior" [9, p. 6]. What an individual firm does, or a few firms do, may be subject to different considerations.

The role of behavioral science must be clarified in the framework of these propositions. I shall proceed to do so with respect to the economic behavior of the household or the consumer, rather than the firm. My justification for thus shifting the argument from Machlup's main concern to a somewhat different area is the following: (a) The restriction of theory on account of monopolistic or oligopolistic conditions, extensively discussed by Machlup does not apply to consumers. Since in a study of consumer behavior only mass behavior is relevant [see 6, p. 219], in this area it is possible to study Machlup's strongest case.[1] (b) Machlup's discussion of total utility applies to households as clearly as to firms. (c) The following statement by Machlup, in which references to management have been omitted, represents the starting point of studies of consumer behavior: the decision-makers' "discretion will be a function . . . chiefly of the independence . . . from urgent worries about the sufficiency of earnings" [9, p. 19].[2] (d) The two examples used by Machlup about household behavior or individual behavior (in his footnotes 4 and 3, respectively) do not illuminate the possibilities of behavioral studies. In addition, it so happens that this writer has done more work on the behavior of the consumer than on the behavior of the firm.

The behavioral sciences study the actions of man or groups of men by applying the scientific method—observation, measurement, testing—to man himself [4, p. 328]. Behavioral economics is concerned primarily with the process of decision making regarding spending, saving, investing, borrowing, pricing, etc., and thus supplements the analysis of interrelationships among results of behavior (amounts spent or saved, business investments, prices) which has been the traditional domain of economics. I shall illustrate the function of behavioral economics by referring to recent studies of consumer behavior.

Example 1 [4, Ch. 20; 5, 6]: Psychological theory postulates that aspirations rise with accomplishment and that concrete and attainable rewards exert a positive stimulus on action. In view of these considerations it is not necessarily true that the larger the assets, the less will consumers save (and therefore the more they will spend). Empirical studies, conducted for the purpose of testing derivations from both economic and psychological hypotheses showed that consumers with large initial liquid assets both saved more and dissaved more than consumers with small initial assets, and that those with private pension rights saved more than those without such rights (when income, age, etc., were held constant). When families who look forward to substantial retirement

[1] True, in sample interview surveys the income, savings, expenditures, as well as motives, attitudes, and expectations of individual consumers are determined. But the purpose of collecting these data is to analyze changes in the behavior of all consumers or of broad groups of consumers (for instance, of consumers with rising income).

[2] This writer's studies of consumer behavior began by postulating that "affluence" makes for increased discretion in consumer action [see 3 and 4].

benefits save more than families who look forward to small retirement benefits, they do not act "irrationally" but in accordance with specific behavioral principles: People exert a greater effort when they are close to their goal than when their goal appears hardly attainable. The findings help to explain the relatively high rate of liquid saving by consumers during the last few years in face of the widespread introduction of private pension plans.

Example 2 [4, Ch. 14]: It follows from assumptions about rational behavior as well as from principles of expectational dynamics that the expectation of sizable price increases will induce some consumers to buy in advance and in excess of needs. However, from psychological principles about the generalization of unfavorable news and of uncertainty, a different outcome of the expectation of small and gradual price increases may be deduced regarding discretionary expenditures. Empirical research disclosed the circumstances under which inflationary expectations induced U.S. consumers to postpone, rather than step up, their discretionary expenditures. In 1966 and 1967 the bad news about rising cost of living and the expectation of having to spend more on necessities made many people feel that they had to cut down on spending money on automobiles and leisure-time activities which they would have liked to have had but did not need immediately. These findings, in turn, lead to an improved theorem of the effects of inflationary expectations.

Example 3 [8, Ch. 9]: It was argued a priori that there was no reason why a tax cut (increase in disposable income )should result in a different response by consumers from any other increase in income of a similar size. Behavioral theory suggests, however, that the response to an income increase which induces people to expect further income increases and raises their levels of aspiration ( + + situation) will be different from a response to an income increase which does not make for optimistic expectations and does not raise levels of aspiration ( + = situation). Empirical studies indicated such a difference in consumers' discretionary expenditures over several years and helped to clarify the developments in 1964-65. Households with stable before-tax income stepped up their expenditures on durables in response to the 1964 tax cut less promptly and to a smaller extent than households which also experienced an increase in wages or salaries because only the latter were viewed as "cumulative" personal accomplishments. These findings add to our understanding of consumer response to income increases.[3]

Example 4 [4, Chs. 9 and 10; 7, 10]: The prevailing large fluctuations in the demand for automobiles and in the incurrence of installment debt by consumers called for a new approach. It began with the hypothesis that consumers' discretionary demand is a function of both ability to buy and willingness to buy. The second step consisted of developing methodological tools suitable for the measurement of changes in intervening variables, such as consumers'

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[3] Machlup asks, "What can be imperfect about the information on a tax increase?" [9, p. 25]. Perhaps nothing. But people's—businessmen's as well as consumers'—notions about the probable outcome of a tax increase are dependent on their attitudes and are "imperfect." These notions, in turn, will influence the response both to a proposal of a tax increase ("announcement effect") and to the reduction in disposable income after the law went into effect.

attitudes and expectations, which reflect changes in willingness to buy. The Survey Research Center constructed an Index of Consumer Sentiment which foreshadowed major turning points in consumers' discretionary demand, for instance, to mention only recent developments, the easing of automobile demand in 1966 (at a time of rising incomes) and its sharp decline in the winter of 1966-67. An analysis of the circumstances under which consumer sentiment improves or deteriorates contributes to an understanding of consumers' use of their discretion and to a theory of consumer behavior.

The four examples may serve to indicate that behavioral research consists of (a) formulating hypotheses, (b) testing derivations from the hypotheses ("translations" of hypotheses into operational terms) through observation and measurement, (c) revising the hypotheses accordingly, (d) testing derivations from the revised hypotheses, etc., with the aim of constructing a theory of economic behavior. While Machlup no doubt does not disagree with this strategy,[4] he fails to recognize that the behavioral approach has already resulted in outcomes different from the nonbehavioral approach and promises to result in additional such outcomes, even regarding the behavior of the firm.

Clearly, a realistic theory does not necessarily represent an improvement. The crucial question is not the one Milton Friedman [2] raised several years ago, "Can a hypothesis be tested by the realism of its assumptions?" (to which question the answer is "No," as stated by Friedman), nor is it "How should traditional economic theory be tested?" It is this: "Traditional economic theory has not proved to be a complete success (many of its implications and predictions have not proved to be correct); how can the theory be improved?" One possible way is by making the underlying assumptions more realistic.[5] The introduction of principles of social learning and of expectational dynamics into economic theory promises progress in this direction.

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[4] Machlup approves "of a busy shuttle-traffic between the domain of theoretical construction and the domain of empirical observation" [5, p. 11].

[5] The last two sentences are reproduced from the writer's discussion contained in Pamphlet 11 of the Social Science Research Council [1, p. 42].

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### Diminishing Returns and Linear Homogeneity: Final Comment

In the December 1963 and September 1964 issues of this *Review* several authors[1] have given examples of linear homogeneous production functions $F = F(x, y)$ ($x \geq 0$, $y \geq 0$ inputs, $F$ output, $F$ two times partially differentiable with respect to $x > 0$, $y > 0$) with the following property $P$: Marginal productivity of at least one of the factors $x, y$ initially monotonically increases up to a maximum point and then monotonically decreases in a certain interval.

All these examples have in common that the marginal productivity of one or both of the factors reaches a minimum point and *thereafter monotonically increases*. In other words, one or both of the following second derivatives of $F$,

$$\frac{\partial^2 F}{\partial x^2} \text{ ($y$ constant),} \qquad \frac{\partial^2 F}{\partial y^2} \text{ ($x$ constant),}$$

are $\geq 0$ for all $x$ or $y$ sufficiently large.

This property, say $P^*$, contradicting the "law of diminishing (marginal) returns"[2] as usually formulated in economics textbooks, is not surprising, for the following theorem is valid:

*Theorem 1.*[3] Let $F = F(x, y)$, $x \geq 0$, $y \geq 0$, be a two times continuously partially differentiable linear homogeneous function.[4] Then for an arbitrary constant $b > 0$, the inequality

$$(1) \qquad \frac{\partial^2 F(x, b)}{\partial x^2} \geq 0 \qquad \text{for } 0 < z < K \ [K = K(b) \text{ a positive constant}]$$

is true if and only if

[1] G. W. Nutter [6], [7], H. H. Liebhafsky [4], Ryuzo Sato [9], J. W. Rowe, Jr. [8], Dieter Schneider [10].

[2] For comments on the history of the so-called Law of Diminishing Returns see in this *Review* Paresh Chattopadhyay's paper [1] setting right historical remarks in the communications [10] and [7] mentioned in footnote 1.

[3] This theorem could easily be derived from the considerations in the proof of Theorem 2 in the paper [2] of Udo Müller and the author.

[4] Note that there is neither assumed $F(x, 0) = F(0, y) = 0$ nor $F(x, y) > 0$ for all $x > 0$, $y > 0$.

(2) $$\frac{\partial^2 F(x, y)}{\partial y^2} \geq 0 \qquad \text{for all } y > \frac{b}{K} x.$$

*Proof.* Because of the linear homogeneity of $F$ the identity

(3) $$F(x, y) = F\left(\frac{y}{b} \frac{x}{y} b, \frac{y}{b} b\right) = \frac{y}{b} F\left(\frac{x}{y} b, b\right)$$

holds for $y > 0$. Differentiating (3) two times with respect to $y$ one gets

(4) $$\frac{\partial^2 F(x, y)}{\partial y^2} = \frac{x^2 b}{y^3} \frac{\partial^2 F(u, b)}{\partial u^2} \qquad \left(u = \frac{x}{y} b, y > 0\right).$$

According to assumption (1) this is $\geq 0$ for $0 < u < K$, i.e., for $y > (b/K)x$. Conversely, if (2) is true, then (1) follows from (4), and the theorem is proved.

Though linear homogeneous functions $F = F(x, y)$ having the property $P$ and consequently the property $P^*$ contradict the usual "law of diminishing (marginal) returns" some of them may make economic sense. Let us consider, for instance, the product surface or "hill of returns" in Figure 1. Formed by rays out of the origin it is a geometric representation of a linear homogeneous function $F = F(x, y)$. As one can see, partial factor variation leads to total product curves which are initially $S$-shaped and which have two points of inflection. After the second of these points, the product curves are strictly convex (from below); that is, the marginal productivity strictly montonically increases. Since this is the case in a region of negative marginal productivity, it is of interest in production theory. Let us remark in this connection that the prototype of a two times continuously partially differentiable total product curve introduced by Ragnar Frisch [3, p. 90] looks something like the curve in Figure 2 *having monotonically increasing marginal productivity to the right of r.*

In the papers referred to in footnote 1 nothing is said about the analytic determination of production functions having the property $P$. Nevertheless, it seems to be of great practical and theoretical importance to devise a method of deriving such functions, not only in the case of two but also of $n > 2$ factors. It is the aim of this communication to describe such a method. It is shown in Section I:

(i) in which way *all* linear homogeneous functions $F = F(x, y)$, $x \geq 0$, $y \geq 0$, with initially S-shaped curves[5] $F = F(x, b)$ ($b > 0$ an arbitrary constant) or $F = F(a, y)$ ($a > 0$ an arbitrary constant) can be determined;

(ii) that, because of the linear homogeneity of $F$, the shape of the curve $F = F(a, y)$ ($a > 0$ an arbitrary constant, $y > 0$) is uniquely determined by the shape of the curve $F = F(x, b)$ ($x \geq 0$; $b > 0$ an arbitrary constant).[6]

[5] For the sake of brevity we write "curve $F = F(x, b)$" instead of "curve represented by $F = F(x, b)$."

[6] For symmetry reasons this could be formulated as follows: (ii) that . . . the shape of the curve $F = F(x, b)$ is uniquely determined by the shape of the curve $F = F(a, y)$.

OUTPUT F

INPUT y

INPUT x
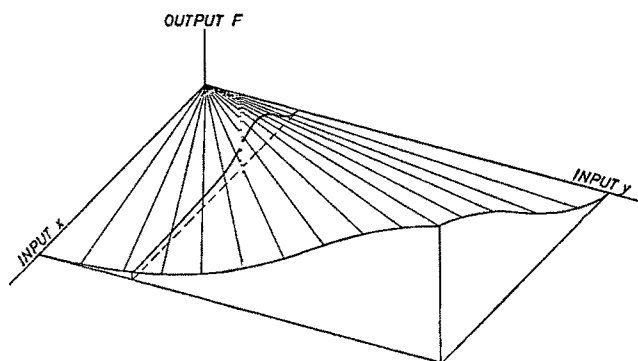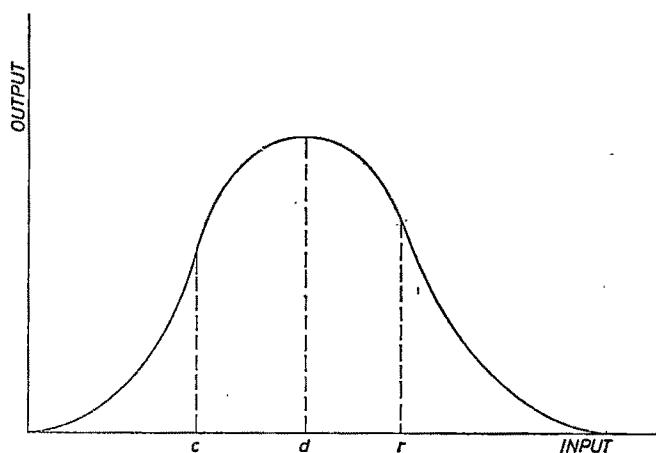
FIGURE 1

FIGURE 2

The results are illustrated by several examples. In Sections II and III theorems and examples for the case of homogeneous functions $F = F(x, y)$ and $F = F(x_1, x_2, \cdots, x_n)$ of degree $\kappa > 0$ are given.

### I. *The Case of Linear Homogeneous Production Functions with Two Factors*

Let $f = f(x)$, $x \geq 0$, be an arbitrary total product curve, and $b > 0$ an arbitrary constant. Do there exist linear homogeneous functions $F = F(x, y)$ such that the identity $F(x, b) = f(x)$ holds? This problem is answered by

*Theorem 2.* Given an arbitrary function $f = f(x)$, $x \geq 0$, and an arbitrary positive constant $b$, there exists one and only one linear homogeneous function $F = F(x, y)$, $x \geq 0$, $y > 0$, with the property

(5) $$F(x, b) = f(x) \qquad (x \geq 0).$$

Note that the preference given to $x$ in this and the following theorems could also be given to $y$.

*Proof of Theorem 2.* The function

$$
(6) \qquad F(x, y) = \frac{y}{b} f\left(\frac{x}{y} b\right) \qquad (x \geq 0, y > 0)
$$

is linear homogeneous and has the property (5). Let $G = G(x, y)$ be another linear homogeneous function with the property (5), that is with the property

$$
(7) \qquad G\left(\frac{x}{y} b, b\right) = f\left(\frac{x}{y} b\right) \qquad (x \geq 0, y > 0).
$$

The linear homogeneity of $G$ yields.

$$
G(x, y) = G\left(\frac{y}{b} \frac{x}{y} b, \frac{y}{b} b\right) = \frac{y}{b} G\left(\frac{x}{y} b, b\right) \qquad (x \geq 0, y > 0),
$$

and because of (7) this equals (6), i.e., (6) is the only function with the desired property. This completes the proof.

With the aid of the above considerations it is easy to prove

*Theorem 3.* Let $F = F(x, y)$, $x \geq 0$, $y > 0$, be an arbitrary linear homogeneous function (read production function, for example). Then there exists a uniquely defined function $f = f(x)$, $x \geq 0$ (read total product curve, for example), such that

$$
(8) \qquad F(x, y) = y f\left(\frac{x}{y}\right) \qquad (x \geq 0, y > 0).
$$

A direct consequence of Theorem 3 is the following:

*Corollary.* Every continuously partially differentiable linear homogeneous production function $F = F(x, y)$, $x \geq 0$, $y > 0$, with initially increasing marginal productivity of the factor $x$ can be constructed by (8), $f = f(x)$, $x \geq 0$, being a suitably chosen continuously differentiable function with initially increasing first order derivative.

It may occur that shapes of $f$ in (8) which are important in production theory yield abnormal properties of $F$. Suppose, for instance, $f = f(x) > 0$ for $x = 0$, and $df(x)/dx$ initially monotonically increasing. Then the first order derivative of (8) with respect to $y$, namely

$$
(9) \qquad \frac{\partial F}{\partial y} = f(u) - u \frac{df(u)}{du} \qquad \left(u = \frac{x}{y}\right),
$$

is greater than 0 for $u$ sufficiently small, that is, for $y$ sufficiently large; furthermore, (9) is monotonically increasing for $y$ sufficiently large. This result may be formulated as follows:

*Theorem 4.* If the "law of diminishing (marginal) returns" is valid for those factors of any continuously partially differentiable production func-

tion which have *positive* marginal productivities for all inputs then there does not exist any continuously partially differentiable linear homogeneous production function $F = F(x, y)$, $x \geq 0$, $y > 0$, with the properties

(i) $F(0, y) > 0$, i.e., $y$ is an "independent input" ("selbständiges Gut") in the terminology of Karl Menger [5, p. 37]

(ii) marginal productivity $\partial F(x, y)/\partial x$ is monotonically increasing for $0 \leq x \leq L(L$ a positive constant depending on $y$).

It should be noted that Theorem 4 is *not* valid: (a) in the case of homogeneity of degree $\kappa < 1$ (see example (26) in Section II); and (b) in the case of more than two factors. Examples of linear homogeneous production functions $F = F(x_1, x_2, \cdots, x_n)$, $n > 2$, with the properties

(i') $F(0, x_2, \cdots, x_n) > 0$ for $x_2 > 0, \cdots, x_n > 0$

(ii') $\partial F(x_1, x_2, \cdots, x_n)/\partial x_1$ is monotonically increasing for $0 \leq x_1 \leq M$ ($M$ a constant depending on $x_2, \cdots, x_n$)

(iii) $[\partial^2 F(x_1, x_2, \cdots, x_n)/\partial x_j^2] < 0$ for all $x_j$ sufficiently large $(j = 1, 2, \cdots, n)$ according to the "law of diminishing returns"

are given in Section III.

Let us now study the remaining case $F(0, y) = 0$ ($y$ "dependent input" = "unselbständiges Gut"), that is, because of (8), $f(0) = 0$. Assuming

(I) $f(x) \geq 0$ for all $x \geq 0$

(II) $f$ continuously differentiable for all $x \geq 0$, two times continuously differentiable for all $x > 0$

(III) $f''(x) \geq 0$[7] for $0 < x \leq c$ ($c$ an arbitrary positive constant), that is, $f'(x)$ initially monotonically increasing

we consider the following two cases which are important in production theory:

(IV) $f''(x) < 0$ for all $x > c$, that is, $f'(x)$ strictly monotonically decreasing for all $x > c$ (according to the "law of diminishing returns")

and (IV'), i.e.:

(IV'a) $f'(x) \geq 0$ for $0 \leq x \leq d$, $f'(x) \leq 0$ for all $x > d$ ($d > c$ an arbitrary constant)

(IV'b) $f''(x) < 0$ for $c < x < r$ ($r \geq d$ an arbitrary constant), that is, $f'(x)$ strictly monotonically decreasing for $c < x < r$

(IV'c) $f''(x) \geq 0$ for all $x > r$, that is, $f'(x)$ monotonically increasing for all $x > r$ (see, in this connection, the argument following the proof of Theorem 1).

Note that every two times continuously differentiable S-shaped total product curve can be represented by functions $f$ satisfying (I), (II), (III), and (IV) (from these conditions and $f(0) = 0$ follows $f'(x) \geq 0$ for all $x \geq 0$) or (I), (II), (III), and (IV'b) (see Figure 2).

*The case* (*I*), (*II*), (*III*), *and* (*IV*). Consider the linear homogeneous function (8) generated by an arbitrary function $f$ with the properties $f(0) = 0$ and (I) to (IV). What is the shape of

$$(10) \qquad\qquad F(x, y) = y f\left(\frac{x}{y}\right)$$

[7] Here and in the following let us write $f''(x)$ for $d^2 f(x)/dx^2$ and $f'(x)$ for $df(x)/dx$.

for $x>0$ fixed? Differentiate (10) two times with respect to $y$:

$$(11) \qquad \frac{\partial F}{\partial y} = f(u) - u \frac{df(u)}{du} \qquad \left( u = \frac{x}{y} \right),$$

$$(12) \qquad \frac{\partial^2 F}{\partial y^2} = \frac{x^2}{y^3} \frac{d^2 f(u)}{du^2} \qquad \left( u = \frac{x}{y} \right).$$

Because of (III), (12)$\geq 0$ for $y \geq (x/c)$; because of (IV), (12)$<0$ for $0<y$ $<(x/c)$; that is, $\partial F/\partial y$ is strictly monotonically *decreasing* for $0<y<(x/c)$ and monotonically *increasing* for $y \geq (x/c)$ (see Theorem 1). From (11), (12) it follows that (10), $x>0$ fixed, is strictly monotonically increasing up to a maximum which is assumed for $u = x/y$ such that

$$(13) \qquad \frac{f(u)}{u} = \frac{df(u)}{du} \qquad \left( u = \frac{x}{y} \right),$$

i.e., for average productivity = marginal productivity ("optimum point" in the terminology of Frisch [3, Ch. 6]). After the maximum, (10), $x>0$ fixed, is throughout monotonically decreasing.

Finally we show that

$$(14) \qquad \lim_{y \to \infty} F(x, y) = \lim_{y \to \infty} yf\left( \frac{x}{y} \right) = xf'(0).[8]$$

Since $f(u)$ is continuously differentiable for $0 \leq u \leq c$ and since $f(0)=0$, by the mean value theorem $f$ can be written

$$(15) \qquad f(u) = uf'(\vartheta u) \qquad \left( 0 < \vartheta < 1, u = \frac{x}{y} \right).$$

Substituting this into the middle of (14), the right member follows. Summing up we have

*Theorem 5.* Let $F = F(x, y)$ be a linear homogeneous production function and let $F = F(x, y)$, $y>0$ fixed, satisfy the conditions $F(0, y) = 0$, (I), (II), (III), and (IV),[9] i.e., let $F = F(x, y)$, $y>0$ fixed, be the analytic representation of some S-shaped total product curve with marginal productivity nowhere negative. Then every total product curve $F = F(x, y)$, $x>0$ fixed, is initially strictly monotonically increasing up to a maximum and then throughout monotonically decreasing, whereas the marginal productivity $\partial F/\partial y$ is initially strictly monotonically decreasing and then throughout monotonically increasing. $F = F(x, y)$, $x>0$ fixed, assumes its maximum when (13) is true, and tends to $x(\partial F(0, 1)/\partial x)$ for $y \to \infty$ [see (14)].

*Analytic and geometric examples.* Analytic examples of functions $f$ satisfying the properties $f(0) = 0$, (I), (II), (III), (IV) are the following ($A$, $B$, $C$, $c$, $x_0$ arbitrary positive constants; $\alpha$, $\beta$ positive constants):

[8] Here and in the following formula (15) we write $f'(a)$ for $df(u)/du|_{u=a}$. Formula (14) states that $F = F(x, y)$, $x>0$ fixed, has an asymptote running parallel with the $y$-axis.

[9] Note that the constant $c$ in (III) and (IV) must not be the same for different $F$'s or $y$'s.

$$(16)\quad f(x) = \frac{Ax^\alpha}{Bx^\beta + C} \qquad (\alpha > 1,\, 0 \le \alpha - \beta < 1)$$

$$(17)\quad f(x) = \begin{cases} 0 & \text{for } x \le x_0 \\[2mm] \dfrac{A(x - x_0)^\alpha}{B(x - x_0)^\beta + C} & \text{for } x \ge x_0 \quad (\alpha > 2,\, 0 \le \alpha - \beta < 1) \end{cases}$$

$$(18)\quad f(x) = \begin{cases} Ax & \text{for } x \le c \\[2mm] \dfrac{A(x - x_0)^\alpha}{\alpha(c - x_0)^{\alpha-1}} - A\left(c - \dfrac{c - x_0}{\alpha}\right) \\[3mm] \qquad\qquad \text{for } x \ge c \quad (c > x_0,\, 0 < \alpha < 1). [10] \end{cases}$$

According to (10), these functions generate the following linear homogeneous functions of two variables ($A$, $B$, $C$, $c$, $x_0$ arbitrary positive constants; $\alpha$, $\beta$ positive constants):

$$(16')\quad F(x, y) = yf\left(\frac{x}{y}\right) = \frac{Ax^\alpha y^{1+\beta-\alpha}}{Bx^\beta + Cy^\beta}$$

$$(\alpha > 1,\, 0 \le \alpha - \beta < 1,\, 0 < 1 + \beta - \alpha \le 1)$$

$$(17')\quad F(x, y) = yf\left(\frac{x}{y}\right) = \begin{cases} 0 & \text{for } \dfrac{x}{y} \le x_0 \\[3mm] \dfrac{A\left(\dfrac{x}{y} - x_0\right)^\alpha y}{B\left(\dfrac{x}{y} - x_0\right)^\beta + C} \\[5mm] \qquad\qquad \text{for } \dfrac{x}{y} \ge x_0 \quad (\alpha > 2,\, 0 \le \alpha - \beta < 1) \end{cases}$$

$$(18')\quad F(x, y) = yf\left(\frac{x}{y}\right) = \begin{cases} Ax & \text{for } \dfrac{x}{y} \le c \\[3mm] \dfrac{A\left(\dfrac{x}{y} - x_0\right)^\alpha y}{\alpha(c - x_0)^{\alpha-1}} + A\left(c - \dfrac{c - x_0}{\alpha}\right) \\[5mm] \qquad\qquad \text{for } \dfrac{x}{y} \ge c \quad (c > x_0,\, 0 < \alpha < 1). \end{cases}$$

Figure 3 gives an impression of the shape of the surfaces (read product surfaces) represented by functions of type (16').

*The case* (*I*), (*II*), (*III*), *and* (*IV'*). Basing on the formulas (10) to (14) the following theorem can be proved as easily as Theorem 5.

[10] $f$ is two times continuously differentiable for all $x \ne c$.
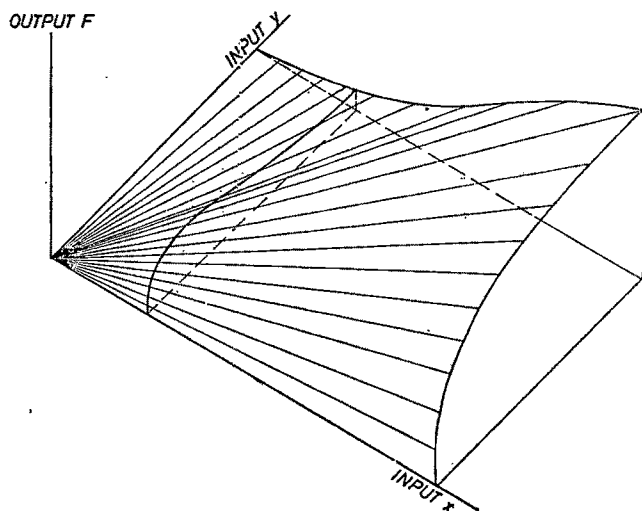
FIGURE 3

*Theorem 6.*[11] Let $F = F(x, y)$ be a linear homogeneous production function and let $F = F(x, y)$, $y > 0$ fixed, possess the properties $F(0, y) = 0$, (I), (II), (III), (IV'a), (IV'b), and (IV'c)[12], i.e., let $F = F(x, y)$, $y > 0$ fixed, be the analytic representation of a bell-shaped[13] total product curve (see, for instance, Figure 2). Then every total product curve $F = F(x, y)$, $x > 0$ fixed, also satisfies the conditions (I), (II), (III), (IV'a), (IV'b), and (IV'c), i.e., has the same properties as the curves $F = F(x, y)$, $y > 0$ fixed, have. $F(x, y)$, $x > 0$ fixed, assumes its maximum when (13) is true, and tends to $x(\partial F(0, 1)/\partial x)$ for $y \to \infty$ [see (14)].

*Analytic and geometric examples.* Let us consider the following four types of functions $f$ satisfying the conditions $f(0) = 0$, (I), (II), (III), (IV'a), (IV'b), and (IV'c) ($A, B, C, x_0, x_1$ arbitrary positive constants; $\alpha, \beta$ positive constants):

$$(19) \quad f(x) = \frac{A x^\alpha}{B x^\beta + C} \qquad (\alpha > 1, \alpha - \beta < 0)$$

$$(20) \quad f(x) = \begin{cases} 0 & \text{for } x \leq x_0 \\ \dfrac{A(x - x_0)^\alpha}{B(x - x_0)^\beta + C} & \text{for all } x \geq x_0 \quad (\alpha > 2, \alpha - \beta < 0) \end{cases}$$

---

[11] This is a slightly generalized version of a theorem which one finds in R. Frisch's book [3, p. 109] under the name "reflexive property of the optimum law (the dual principle)."

[12] Note that the constants $c, d$, and $r$ in (III), (IV'a), (IV'b), and (IV'c) may depend on the $F$'s and $y$'s.

[13] In the case $f'(x) = 0$ for $x > d$ [see (IV'a), (IV'b) with $r = d$, (IV'c) with $f''(x) = 0$ for all $x > r$] one would have a "degenerated bell-shaped curve."

(21)  $f(x) = \begin{cases} Ax^{\alpha}(x_1 - x)^{\beta} & \text{for } 0 \leq x \leq x_1 \quad (\alpha > 1, \beta > 2) \\ 0 & \text{for all } x \geq x_1 \end{cases}$

(22)  $f(x) = \begin{cases} 0 & \text{for all } 0 \leq x \leq x_0 \\ A(x - x_0)^{\alpha}(x_1 - x)^{\beta} & \text{for } x_0 \leq x \leq x_1 \quad (x_0 < x_1, \alpha > 2, \beta > 2) \\ 0 & \text{for all } x \geq x_1. \end{cases}$

With the aid of these functions the following linear homogeneous functions $F(x, y) = yf(x/y)$ can be generated ($A$, $B$, $C$, $x_0$, $x_1$ arbitrary positive constants; $\alpha$, $\beta$ positive constants):

(19′)  $F(x, y) = \dfrac{A x^{\alpha} y^{1+\beta-\alpha}}{B x^{\beta} + C y^{\beta}} \qquad (\alpha > 1, \alpha - \beta < 0)$[14]

(20′)  $F(x, y) = \begin{cases} 0 & \text{for } \dfrac{x}{y} \leq x_0 \\[2mm] \dfrac{A\left(\dfrac{x}{y} - x_0\right)^{\alpha} y}{B\left(\dfrac{x}{y} - x_0\right)^{\beta} + C} & \text{for } \dfrac{x}{y} \geq x_0 \quad (\alpha > 2, \alpha - \beta < 0) \end{cases}$

(21′)  $F(x, y) = \begin{cases} A\dfrac{x^{\alpha}}{y^{\alpha}}\left(x_1 - \dfrac{x}{y}\right)^{\beta} y & \text{for } 0 \leq \dfrac{x}{y} \leq x_1 \quad (\alpha > 1, \beta > 2) \\[2mm] 0 & \text{for } \dfrac{x}{y} \geq x_1 \end{cases}$

(22′)  $F(x, y) = \begin{cases} 0 & \text{for } 0 \leq \dfrac{x}{y} \leq x_0 \\[2mm] A\left(\dfrac{x}{y} - x_0\right)^{\alpha}\left(x_1 - \dfrac{x}{y}\right)^{\beta} y & \\[1mm] & \text{for } x_0 \leq \dfrac{x}{y} \leq x_1 \quad (x_0 < x_1, \alpha > 2, \beta > 2) \\[2mm] 0 & \text{for } \dfrac{x}{y} \geq x_1. \end{cases}$

For the shape of the surfaces represented by functions of type (19′) or (22′) see Figures 1 and 4, respectively.

[14] Special cases of (19′) have been published by Ryuzo Sato [9, p. 744]: $\alpha = 2, \beta = 3$, and by J. W. Rowe, Jr. [8, p. 746]: $\beta = 2\alpha - 1$.
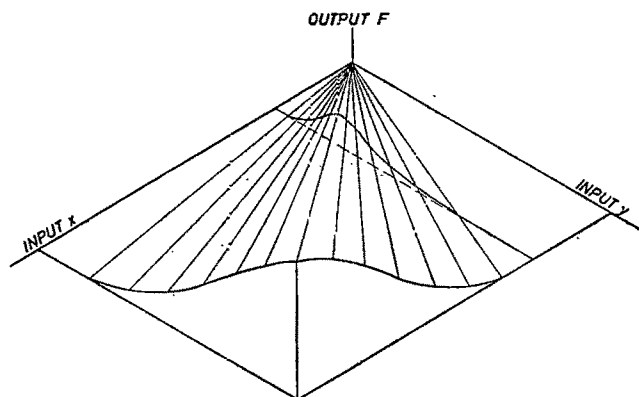
FIGURE 4

## II. *The Case of Homogeneous Production Functions with Two Factors*

A production function $F = F(x, y)$, $x \geq 0$, $y \geq 0$, is called *homogeneous of degree* $\kappa$ ($\kappa > 0$ a constant) if the identity

$$(23) \qquad F(\lambda x, \lambda y) = \lambda^\kappa F(x, y)$$

holds for all $x \geq 0$, $y \geq 0$, $\lambda \geq 0$ ($\lambda^\kappa = 0$ for $\lambda = 0$); $\kappa = 1$ is the case of linear homogeneity. From (23) one gets

$$(24) \quad F(x, y) = F\left(\frac{y}{b} \frac{x}{y} b, \frac{y}{b} b\right) = \frac{y^\kappa}{b^\kappa} F\left(\frac{x}{y} b, b\right) \qquad (y > 0, b > 0).$$

By means of (24) it is easy to prove that the theorems 1 to 5 remain true exactly for the following degrees $\kappa$ of homogeneity of the considered functions:

Theorem 1 for $\kappa \leq 1$; for $\kappa > 1$ (say $\kappa = 1 + \epsilon$) Theorem 1 would not be valid as may be seen by the following example:

$$(25) \quad F(x, y) = \frac{A x^{1+\epsilon/2} y^{1+\epsilon/2}}{Bx + Cy} \quad (\epsilon < 2, A, B, C \text{ arbitrary positive constants});$$

Theorem 2 for all $\kappa > 0$;
Theorem 3 [(8) replaced by $F(x, y) = y^\kappa f(x/y)$] for all $\kappa > 0$;
Theorem 4 for $\kappa \geq 1$ but not for $\kappa < 1$:

$$(26) \qquad F(x, y) = \frac{A x^{\kappa+\beta}}{Bx^\beta + Cy^\beta} + Dy^\kappa$$

$$(A, B, C, D \text{ arbitrary positive constants}, 0 < \kappa < 1, \kappa + \beta > 1)$$

is homogeneous of degree $\kappa < 1$, satisfies the conditions (i), (ii) of Theorem 4, and runs according to the "law of diminishing (marginal) returns";

Theorem 5 (its last assertion being replaced by "$F(x, y)$, $x > 0$ fixed, tends

to zero for $y \to \infty$ ") for $\kappa \leq 1$; for $\kappa > 1$ Theorem 5 does not remain true as to be seen by the example (25).

Note that Theorem 6, i.e., the "reflexive property of the optimum law" is not valid in the case of homogeneity of degree $\kappa \neq 1$. This is shown by the following examples of degree $\kappa = 1 - \epsilon$ $(0 < \epsilon < 1)$:

$$F(x, y) = \frac{A x^\alpha y^{1-\epsilon+\beta-\alpha}}{B x^\beta + C y^\beta} \qquad (\alpha > 1, \ \alpha - \beta < 0, \ \beta - \alpha - \epsilon < 0)$$

and $\kappa = 1 + \epsilon$ $(\epsilon > 0)$:

$$F(x, y) = \frac{A x^\alpha y^{1+\epsilon+\beta-\alpha}}{B x^\beta + C y^\beta} \qquad (\alpha > 1, \ \alpha - \beta < 0, \ 0 < 1 + \epsilon - \alpha < 1).$$

III. *The Case of Homogeneous Production Functions with* $n \geq 3$ *Factors*

Let $F = F(x_1, x_2, \cdots, x_n)$, $x_1 \geq 0$, $x_2 \geq 0$, $\cdots$, $x_n \geq 0$, be a homogeneous function of degree $\kappa$. As one proves by the identity

$$F(x_1, x_2, \cdots, x_n) = F\left( x_n \frac{x_1}{x_n}, \ x_n \frac{x_2}{x_n}, \ \cdots, \ x_n \frac{x_{n-1}}{x_n}, \ x_n \right)$$

$$= x_n^\kappa F\left( \frac{x_1}{x_n}, \ \frac{x_2}{x_n}, \ \cdots, \ \frac{x_{n-1}}{x_n}, \ 1 \right) \qquad (x_n > 0)$$

there exists one and only one function $G(x_1, x_2, \cdots, x_{n-1})$ such that, for all $x_n > 0$,

$$(27) \qquad F(x_1, x_2, \cdots, x_n) = x_n^\kappa G\left( \frac{x_1}{x_n}, \ \frac{x_2}{x_n}, \ \cdots, \ \frac{x_{n-1}}{x_n} \right).$$

Conversely, every function (27), $x_n > 0$, generated by an *arbitrary* function $G = G(x_1, x_2, \cdots, x_{n-1})$, is homogeneous of degree $\kappa$.

One may easily give examples of functions $G$ such that (27), $(n-1)$ of the variables fixed, always represents some initially S-shaped curve. Take, for instance,

$$G = \frac{A x_1^{\alpha_1} x_2^{\alpha_2} \cdots x_{n-2}^{\alpha_{n-2}} x_{n-1}^{\alpha_{n-1}}}{B_1 x_1^\beta + B_2 x_2^\beta + \cdots + B_{n-1} x_{n-1}^\beta + B_n}$$

$$\begin{cases} A > 0, \ B_j > 0 \quad (j = 1, 2, \cdots, n) \\ \text{arbitrary constants,} \\ \alpha_i > 1, \ \alpha_k - \beta < 1 \quad (k = 1, 2, \cdots, n-1) \end{cases}$$

which can be understood as a generalization of the functions (16) and (19). Then

(28)
$$F = \frac{A x_1^{\alpha_1} x_2^{\alpha_2} \cdots x_{n-1}^{\alpha_{n-1}} x_n^{\alpha_n}}{B_1 x_1^\beta + E_2 x_2^\beta + \cdots + B_{n-1} x_{2-1}^\beta + B_n x_n^\beta}$$

$$\begin{cases} A, B_j, \alpha_k, \beta \text{ as above,} \\ \alpha_n = \kappa + \beta - \alpha_1 - \cdots - \alpha_{n-1} > 1, \\ \kappa > 0, \alpha_n - \beta < 1 \end{cases}$$

is a homogeneous function of degree $\kappa > 0$ with the desired property. If $0 \le \alpha_j - \beta < 1$ for $j = 1, 2, \cdots, n$, then the marginal productivities $\partial F / \partial x_j$ are positive for all $x_j > 0$.

The function (28) does not satisfy the condition (i') above. We show that there exist *linear homogeneous* functions of $n \ge 3$ variables[15] having the properties (i'), (ii'), (iii), which are of interest in production theory. Substituting

$$G(x_1, x_2, \cdots, x_{n-1}) = \frac{A x_1^{\alpha_1}}{B x_1^\beta + C} + D x_2^{\alpha_2} x_3^{\alpha_3} \cdots x_{n-1}^{\alpha_{n-1}}$$

($A, B, C, D$ arbitrary positive constants, $\alpha_1 > 1$, $0 \le \alpha_1 - \beta < 1$, $\alpha_l > 0$ $(l = 2, 3, \cdots, n-1)$, $\alpha_2 + \alpha_3 + \cdots + \alpha_{n-1} < 1$) in (27) one gets

$$F(x_1, x_2, x_3, \cdots, x_{n-1}, x_n)$$
$$= \frac{A x_1^{\alpha_1} x_n^{1+\beta-\alpha_1}}{B x_1^\beta + C x_n^\beta} + D x_2^{\alpha_2} x_3^{\alpha_3} \cdots x_{n-1}^{\alpha_{n-1}} x_n^{1-\alpha_2-\alpha_3-\cdots-\alpha_{n-}}$$

This is a linear homogeneous function with the desired properties.

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[15] For the case $n = 2$ see Theorem 4.

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## On the Measurement of Capacity Utilization: Comment

The recent article in this *Review* by Klein and Preston [3] (hereafter referred to as K & P) adds substantially to our understanding of the problem of measuring capacity utilization in industrial sectors of our economy. It provides a revised and improved set of Wharton indexes. The index for the total manufacturing sector agrees much of the time quite closely with the newly published Federal Reserve index [2]. Moreover the revised Wharton indexes provide, for most of the eleven industrial sectors covered, a firmer basis for fixing the absolute level of capacity utilization measures than had previously been available.[1]

The procedure developed by K & P involves three main steps: (1) determining total manhours of labor available each quarter from 1948 to 1960 for the whole economy except for agriculture and the self-employed; (2) apportioning this total to the several industrial sectors; and (3) determining a Cobb-Douglas production function for each sector. K & P infer their capacity utilization measures from $(L_{et}/L_t)^{\alpha+\beta}v_t$, where $L_{et}$ is actual sector manhours, $L_t$ is available sector manhours, $\alpha$ and $\beta$ are the sector labor and capital exponents respectively, and $v_t$ is "the disturbance at time $t$."

In the case of each of nine of the eleven sectors for which they have estimated production functions, K & P find $\alpha+\beta$ is greater than one.[2] They comment that "the data suggest that increasing returns to scale is the proper assumption" in these cases. I question the appropriateness of the words "returns to scale" here. Presumably a major factor making for an $\alpha+\beta$ greater than one in these nine sectors was a sharper upward trend and a wider cycle in output than in labor input. And in a situation in which output shows an upward trend and labor input a downward trend their formula for relating these variables may well be questionable.[3]

The ratio $(L_{et}/L_t)$ is a measure of sector labor force utilization. The reliance K & P put on this ratio suggests that it merits separate consideration. An attempt to determine it for manufacturing for the past decade raises a question. For their Step 1, K & P assume that "full employment aggregate

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[1] [6] makes clear that the various indexes now available differ significantly in absolute level.

[2] The exceptions are Food and Beverages and Chemicals.

[3] K & P characterize their findings for Food and Beverages as "the least reasonable estimate of $\alpha$ and $\beta$" among the eleven. The output trend for this sector from 1947 to 1960 was upward; the trend of the number of production workers employed was downward.

TABLE 1—UTILIZATION INDEXES 1957–1966

| | Labor Force Utilization | | | | Capacity Utilization | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | I | II | III | IV |
| 1957 | 85 | 84 | 83 | 80 | 87 | 85 | 84 | 79 |
| 1958 | 73 | 71 | 74 | 76 | 72 | 71 | 75 | 78 |
| 1959 | 76 | 80 | 79 | 78 | 81 | 85 | 81 | 80 |
| 1960 | 79 | 78 | 76 | 74 | 84 | 82 | 80 | 77 |
| 1961 | 74 | 75 | 76 | 78 | 75 | 78 | 80 | 82 |
| 1962 | 78 | 79 | 79 | 78 | 82 | 83 | 83 | 82 |
| 1963 | 77 | 78 | 79 | 81 | 82 | 84 | 84 | 84 |
| 1964 | 79 | 80 | 80 | 81 | 85 | 86 | 87 | 87 |
| 1965 | 84 | 83 | 84 | 86 | 89 | 89 | 89 | 89 |
| 1966 | 88 | 90 | 90 | 90 | 91 | 91 | 91 | 90 |

manhours" is a "smooth monotonic increasing function of time." If my reading of their Chart 1 [3, p. 40] is correct, they have estimated that from 1955-IV to 1960-IV "full employment aggregate manhours" increased at an annual rate of approximately $\frac{1}{2}$ per cent per year. During the three years from 1963 to 1966 actual nonfarm manhours increased at just over a 3 per cent per annum rate [5, p. 249]. I suspect that, in view of their monotonic function assumption (which surely is a reasonable one), a material upward revision of estimated "full employment aggregate manhours" for 1960-IV may be called for.

To explore what has happened to labor force utilization in the manu-facturing sector, rough estimates of manhours available have been made for 1956-IV to 1966-IV on a basis that dodges the problem of such revision. The ratios of actual production worker manhours to these estimated man-hours available have been computed to provide a labor force utilization in-dex.[4] For each of the two benchmark quarters, 1956-IV and 1966-IV, man-hours available were assumed equal to actual manhours divided by the Federal Reserve capacity utilization index for that quarter [2] [5]. Esti-mates of manhours available for the intervening quarters of the period were made by linear interpolations. The labor force utilization index computed from these estimates and the Federal Reserve capacity utilization index are compared in the table below. The pattern the former shows is mainly the re-sult of the linear interpolations. The levels of the benchmark figures may well be significantly in error; but the ten-year percentage increase they show should be approximately correct.

For the most part the two indexes move up and down together. The prin-cipal exception is that from 1963-IV to 1964-I the Federal Reserve capacity utilization index increased by one percentage point; the labor utilization index decreased by two percentage points. There were also five instances in which one index showed no change while the other changed by two or three percentage points. As might be expected during the years of high unemploy-

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[4] Actual production worker manhours were estimated as the product of average employ-ment, seasonally adjusted, times average hours per week.

ment, 1959–1964, the labor force utilization index was about four percentage points below the Federal Reserve capacity utilization index.

It should be noted that indexes of labor force utilization like the one presented here could easily be computed for the various industrial sectors for which manhour data are currently available.

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## The Price Sensitivity of Petroleum Exploration: Comment

That crude petroleum price levels have some effect on the volume of petroleum exploration cannot be seriously challenged, for the *reductio ad absurdum* argument is always available that if expected crude price declined to zero, then incentives to explore would disappear. However, Davidson has repeatedly claimed that exploration volume is not very sensitive to crude oil price changes.

> The land owner of any undeveloped oil property exhibits a perfectly inelastic supply function for his mineral rights—there is no alternative use. Thus, lease bonus and royalty payments are . . . Ricardian rent payments. Since a reduction in percentage depletion is equivalent to the levying of an ad valorem excise tax, it follows that if the depletion allowance is reduced . . . the tax could be passed back completely to those landowners who were not protected by existing contracts.

> Thus, a reduction in the depletion allowance would not, in itself, change the expected income stream, net of lease bonuses and royalty payments, on undeveloped oil properties; consequently, in the long run, there should be no reduction in the incentives to explore nonproductive oil lands [3, pp. 104-5].

It follows therefore that the supply of nonhomogeneous oil lands is highly

inelastic and that percentage depletion added substantially to the huge windfalls received by landowners. Accordingly, for each dollar of subsidy granted, most went to intramarginal rents and little was left to encourage the exploration of otherwise inframarginal no-rent land [4, p. 130].

It seems clear that lease bonus and royalty payments to many landowners could be reduced substantially without altering the supply of petroleum lands. However, it does not follow that a moderate crude oil price reduction (or a reduction in the depletion allowance) can eventually be passed largely back to the landowners without causing much effect on the incentive to explore currently nonproductive oil lands. Kahn and 'Campbell have attacked Davidson's conclusions by challenging his assumptions about the supply of petroleum lands [5, pp. 289-94] [2]. They point out that an inelastic supply of land does not necessarily imply an inelastic supply of oil, any more than a fixed supply of land implies an inelastic supply of wheat in the Ricardian model. A higher price thus will not go merely into rents, but into extending the margin of exploration (or cultivation in the Ricardian model) and eliciting additional supplies as well.[1]

However, there is another very important consideration—the distribution of rents under conditions of uncertainty. Davidson realized the need to discuss this point and produced the following argument [4, pp. 127-28]:

(1) If the future income stream of each oil-bearing property were known with certainty, then the lease bonus would exactly equal the discounted value of the future economic rents on the property, and all rents would go to the landowner.

(2) However, there is usually very substantial uncertainty about the future income stream from a potential tract of oil land. Because of this uncertainty, it is quite unlikely that the *ex ante* rent estimates of either party will closely approximate the *ex post* economic rent which actually is realized. Therefore, a royalty payment based on a percentage of the gross value of the oil as it is produced allows the producer and the landowner to share the inherent risk. The way the parties agree to split the expected economic rent into a fixed sum (the lease bonus) and a variable sum (the royalty) depends, in part, on the expected risk associated with the particular tract.

(3) Therefore, given uncertainty, the depletion allowance merely raises both the landowners' and the producers' estimates of the *ex ante* rent. There is no reason to believe that this subsidy will systematically increase the amount the producers might receive in the absence of the depletion allowance, and therefore it should not significantly encourage additional exploration of oil lands.

The purpose of this note is to question the validity of the conclusion stated in the preceding sentence. There exist at least two reasons for believing that the depletion allowance subsidy does indeed increase the absolute amount of economic rent that accrues to the producers. First, recent developments in the theory of capital budgeting indicate that no risk-averting investor would be

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[1] This summary of the Kahn and Campbell criticism is a paraphrase of the referee's concise and cogent remarks on this subject.

willing to offer as much as the expected present value of the stream of returns
from an investment unless this stream of returns were negatively correlated
with other investments in his portfolio [6, pp. 28-33]; rather, such an inves-
tor would be willing to offer, at most, the "certainty equivalent" value of the
expected return stream. In Lintner's model the difference between the expected
value and the certainty equivalent value of the return stream is an increasing
function of (1) the variance of the project's own present value return, (2) the
project's aggregate present value return covariance with assets already held by
the company, and (3) the project's total covariance with other projects con-
currently included in the capital budget [6, p. 31].[2]

That the variance of a particular exploration project's present value return is
likely to be high is common knowledge. However, it is important to note that
total project covariances with other petroleum company assets and projects are
also likely to be quite high because the returns to most of these projects are
closely related to the price of crude oil; thus, a crude oil price change would
tend to cause the large majority of project returns to change in the same direc-
tion. Therefore, almost surely the certainty equivalent value of a tract of po-
tentially productive petroleum land, in terms of Lintner's model or similar
models, is considerably less than the expected present value of the tract.

Suppose that the expected present values of the stream of returns from oil
properties were to drop because of the removal of the depletion allowance. Da-
vidson implies that the absolute amount of this decrease could be passed back
to landowners not already protected by contracts and that the aggregate *ex
post* rent retained by the producers (as compensation for their risk-bearing)
need not change. However, this is not the prediction implied by the Lintner
model. The variances and covariances of the projects are measured in dollar
values (not normalized rates of return). Thus the variances and the covari-
ances will decrease as the expected present value falls, and the expected present
value and the certainty equivalent will move closer together. If market condi-
tions were such that each producer would be forced to offer his certainty
equivalent value for each tract, the absolute amount of the decrease in expected
present value caused by the removal of the depletion allowance could not be
fully passed back to landowners.

Secondly, most petroleum lands leases are not sold at open competitive auc-
tions; indeed, most transactions between private landowners and petroleum
companies are not the result of auction bidding at all. Publicly owned lands
(for example, the outer continental shelf lands controlled by the federal gov-
ernment and the public lands of the states of Louisiana and Texas) are typi-
cally sold at sealed bid auctions. These facts suggest that a rational firm often
has a strong incentive to bid less than its certainty equivalent price for a tract.
This is true since, in any situation other than an open competitive auction, a

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[2] If one uses different assumptions than Lintner, the difference between the expected value
and the certainty equivalent value (i.e., the "risk discount") may not be expressible in
exactly these same terms; yet two general features remain in most of the models that have
yet been proposed—the risk discount is an increasing function of the project's present value
return variability and the positive relationships between the returns from the project and
those from other assets already held by the firm and new projects in the firm's capital
budget.

bid below the firm's certainty equivalent value may well have a non-zero probability of winning. For example, consider a sealed bid auction for a tract. Let $C$ be the certainty equivalent value of the tract, $X$ the amount actually bid, and $P(X)$ the probability that the bid of amount $X$ will win. A firm that wished to maximize its "oligopsonistic profit" $E(X)$ would try to choose that bid amount $X$ which would maximize the following expression:

$$(1) \qquad E(X) = (C - X)P(X).$$

The first order conditions for maximizing this expression require that

$$CP'(X) - XP'(X) - P(X) = 0,$$

or, rearranging, that

$$(2) \qquad X = C - P(X)/P'(X).$$

Since $P(X)$ and $P'(X)$ are both positive,[3] then the profit-maximizing bid is the certainty equivalent value, less some additional discount. The amount of this discount, of course, will depend upon the explicit formulation of $P(X)$. Under certain circumstances, this discount amount might be quite substantial. For example, in a bidding model proposed in the author's dissertation, an example is demonstrated for a sealed bid auction with five competing bidders in which the profit maximizing bid was \$38.65 for a particular firm's certainty equivalent value[4] of \$100.00 [1, pp. 75-86]. It is not suggested that the typical discount need be this large; however, such a discount appears at least possible. A similar model could be developed for a sequential bidding situation in which the landholder is visited at random intervals by petroleum company representatives who give him offers which are good for a short time only. In this case, too, there appears a strong incentive to bid below the certainty equivalent value, because of a finite probability of acceptance. If the landowner knows the certainty equivalent value of the tract to each company, he can "hold out" until some bid near this amount had been received. However, typically the landowner does not know nearly so much about the potential of the land as the bidding companies; therefore, the risk of holding out is greatly increased, and the landowner may capitulate for much less lucrative terms than he could have obtained had he had as much information as the bidding companies.

An examination of equation (2) shows that it is possible that decreases in the certainty equivalent value of tracts could be passed back entirely to the landowners in the form of lower bids; whether this would be likely or not depends upon the assumption made about the form of $P(X)$. In the case of the dissertation bidding model, the optimal bid $(X^*)$ is some fraction of the certainty equivalent value; i.e.,

$$X^* = C/g(n, \sigma),$$

[3] That $P'(X)$ be positive implies the very reasonable assumption that the higher the amount bid, the greater the probability of winning.

[4] In the model used in the dissertation, the expected value of the tract was used instead of its certainty equivalent. Stating the problem in terms of the certainty equivalent instead of the expected value seems to me now to represent an improvement in the model there discussed. However, none of the numerical results are changed by making this substitution.

where $g(n, \sigma)$ is a function of the number of competing bidders and the expected standard deviation of the bids [1, pp. 75-86]. Therefore, if $C$ declines because of the removal of the depletion allowance, $X$ will decline proportionately, and $(C-X)$, an amount of rent accruing (on the average) to the winning bidder, will decline absolutely.

Thus there appear to exist at least two reasons which strongly suggest that the absolute amounts of economic rents that petroleum companies are able to retain for themselves would be substantially decreased if the depletion allowance were abolished. If this occurred, it seems quite likely that the reduced economic incentives for exploration would cause a marked decrease in exploration expenditures.

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## Peak Load Pricing and Optimal Capacity: Comment

In his paper on the theory of peak load pricing, Oliver E. Williamson [1] develops the analysis so that it is of greater general application than the earlier solutions to the problem of peak load pricing. In particular he develops the means of handling time periods of different length and of pricing optimally either when significant indivisibilities exist or otherwise. These are significant points not covered by earlier writers.

The purpose of this note is to extend Williamson's analysis to take into account differences in plant costs. His analysis can be extended to deal with the problems of choice in servicing peak loads. It can be used to show that it may be rational to install and/or replace plants in which average costs exceed those of an "efficiency unit."[1] if efficiency units experience significant

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[1] Williamson's terminology will be used throughout. See [1 p. 814].
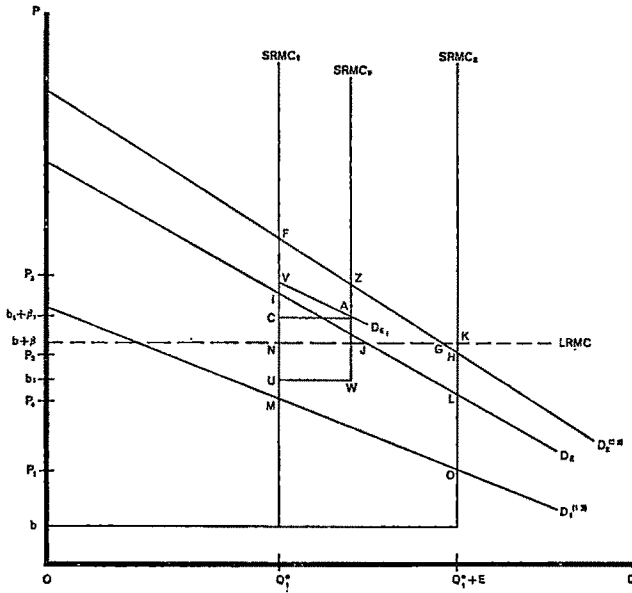
FIGURE 1

indivisibilities. Optimal prices and capacity are shown below. Finally, some of the elementary dynamic considerations implied are outlined.

Williamson's assumptions about Pareto optimality and the social welfare function are retained throughout. Initially the system has capacity of $Q_1^*$, as shown in Williamson's Figure 3 [1, p. 824] and as shown above in the diagram. The choice available to the system is either to install an additional efficiency unit $(E)$ or install a "peak-load-plant" for which no significant indivisibilities exist. Marginal operating costs and marginal capacity costs of the efficiency unit $(E)$ are $b$ and $\beta$, respectively. Marginal operating costs for the peak-load-plant are $b_t$ and capacity costs are $\beta_t$ where $(\beta_t + b_t) > (\beta + b)$.

To decide which alternative is more attractive the net gain (as defined in the social welfare function) available to each must be compared. $Q_1^*$ is treated as the vertical axis and the effective demand for capacity curve for residual demands (those to the right of $Q_1^*$) for each investment alternative (in this case $D_E$ and $D_{Et}$) are drawn. The optimal size of peak-load-plant is given by the intersection $(\beta_t + b_t)$ with the corresponding effective demand for capacity curve $(D_{Et})$. The resulting net gain is $VAC$. As the net gain is positive and (by construction) the net gain from an efficiency unit $(E)$ is zero the peak-load-plant is more attractive. Optimal prices are derived by exactly the same method as Williamson uses. The price at the peak period $(P_3)$ is where $D_2$ cuts $SRMC_3$, i.e., $Z$, and the off peak price $(P_4)$ is where $D_1$ cuts $SRMC_1$, i.e., $M$.

The above assumes purely static conditions. However, it is a simple

matter to take into account dynamic considerations. Thus where demand is increasing the choice is between a peak-load-plant giving an immediate net gain, and an efficiency unit giving a net gain some time in the future. A simple discounting procedure would enable the decision as to which plant to invest in to be made.

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## The Graduated Fair Return: Comment

In the June 1966 issue of this *Review*, Alvin K. Klevorick offers and persuasively defends an ingenious proposal for offsetting the distortion—noted by Averch and Johnson and Wellicz and elaborated by Westfield and Shepherd [1] [26] [27] [18]—that is introduced into the investment decision of public utility companies by a system of regulation that consists primarily of holding them to some fixed rate of return on investment [14]. His solution—to graduate the permissible return downward with progressively larger stocks of capital—is appropriate to the problem in question. If correctly applied, it would offset any tendency for regulated companies to make investments whose marginal value product is less than their marginal cost.

The purpose of this communication is to raise the question whether the particular distorting factor he seeks to offset represents a more or a less powerful influence on investment than another, the recognition of which has a much more venerable tradition in the literature, and which operates in the opposite direction: monopoly itself. The Klevorick proposal could make matters worse rather than better, depending on which of these two influences is the stronger.

The private marginal revenue product of public utility investments can diverge from the social for two, partially offsetting reasons. The "A-J-W effect" (let us so identify it, after Averch, Johnson and Wellicz) increases the former relative to the latter, because to the net revenues directly generated by incremental investments, if they fall short of yielding the allowed rate of return, can be added the revenues the company can recoup by raising rates on other parts of its business, so long as the regulatory authority has previously prevented it from fully exploiting its monopoly power in those markets.[1] The monopoly

[1] Joel Dirlam and I made the analogous point with respect to the possibility of a regulated monopolist recouping in markets of inelastic demand revenue losses resulting from discriminatory price reductions in markets of more elastic demand. Incidentally, in reviewing our book in this *Review*, John S. McGee misrepresented our argument at this point, attributing to us "the dubious argument that discrimination is bad because it may involve 'recoupment'" (*Am. Econ. Rev.*, June 1955, *45*, 453). Since, as we specifically pointed out, recoupment is possible only in the absence of previous profit maximization and is not

that most regulated companies enjoy on a large portion of their business has the opposite tendency, in the absence of completely effective regulation;[2] it makes marginal revenue smaller than average, and it therefore tends to produce under- rather than overinvestment.

This is not to suggest that these two tendencies counteract each other in all investment decisions. The second would be no offset to the first with respect to alternative methods of producing a given level of output: for example, by (excessive) substitution of capital for labor or for other variable inputs where the effect was not necessarily to expand service.[3] Nor would it be an important restraining influence on investments in the service of more competitive markets, where elasticity of demand would be greater and the divergence between marginal and average revenue correspondingly less.

But the two tendencies would clearly conflict where the investment under consideration involved the expansion of capacity to produce for the markets in which the utility has great monopoly power. Shepherd cites as "the most glaring instance" of public utility companies' ignoring marginal cost principles their aversion to thoroughgoing peak-responsibility pricing: i.e., to levying all capacity costs on use at the peak [19, p. 265 n.; cf. 21, 12]. In my judgment this attitude is attributable in part to the A-J-W effect: if peak users can be charged less than the full capacity costs for which they are (marginally) responsible, this "justifies" a greater capacity and a larger rate-base, the costs of which can then be recouped partially from offpeak users (see also, on this, [6, pp. 150-51] [26, pp. 35-36] [17, pp. 58, 61, 64]). So we do have a tendency to overinvestment on this account. But it is precisely with respect to such investments that monopoly has heretofore been accused of promoting excessive conservatism (see, e.g., [11] [2, Ch. 2] [5, pp. 339, 342-45] [7]). It is significant that the main agencies adopted to offset this conservatism, public power authorities and "tough" regulatory commissions, have, according to Shepherd's survey [17, pp. 63-65], been as a group markedly worse than average offenders against such marginalist practices as peak-responsibility pricing.[4] These agencies have regarded it as their mandate to promote an expanded use of electricity: this was TVA's explicit purpose, and it, according to Shepherd, practices no marginalist pricing at all.

A-J-W and the others in effect assume that regulation eliminates the monopoly problem. By holding price to average total cost including some maximum permissible rate of return, regulation, they assume, forces the public utility company to increase capacity and output until $ATC$ and $AR$ (rather than $MR$) are equated (see, e.g., [1, pp. 1056-57]). Or, to put it another way, effective regulation makes the marginal revenue product of the utility company's invest-

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therefore ordinarily to be expected [8, pp. 208-9], we did not construct any general case against price discrimination on this ground.

[2] The significance of this qualification is spelled out below.

[3] On the differential attitude of oligopolists toward output-expanding and factor-saving innovations, see [15, pp. 21-25].

[4] For a description of the similar effects of tough F.P.C. regulation in allocating costs between jurisdictional and nonjurisdictional sales of gas, see [26, p. 31].

ments the same as the average revenue product, thus eliminating any tendency to monopolistic restriction.

But regulation is not instantaneously effective: the equation of marginal and average returns on incremental investment would require immediate rate readjustments to hold overall rates of return at the permissible level. More important, as the traditional critics of public utility regulation have pointed out, merely holding the overall rate of return to competitive levels does not suffice to assure competitive levels of capacity and output. The reason for this is that regulators can never be certain about the elasticity of demand and the behavior of unit costs with increased sales. In the face of these inescapable uncertainties, commissions are powerless to order rate reductions, such as might well prove justified, *ex post,* so long as the regulated companies are earning no more than the permissible return on their rate bases (see, e.g. [25, p. 228]). Competition automatically probes the elasticity of demand and long-run behavior of costs; regulation cannot. TVA did what regulatory commissions could not require private companies to do: set low rates and see what happened to demand and cost (see [16, pp. 733-43] [23, pp. 493-94, 651-52]).

I have no way of knowing which of these distorting influences is the more powerful. But there is one phenomenon, of particular importance in the public utility area, that tends to reduce the importance of the former and increase that of the latter, in those situations in which both could be operative; that is long-run decreasing costs. Static economies of scale[5] place long-run marginal costs below average total costs; and unusually rapid technological progress[6] may produce the same result, when average costs are estimated for some past test year and return (including depreciation and provision for income tax) is computed on an historical rate base.[7] Public utility economists and engineers have quoted to me rule-of-thumb estimates of 30 to 40 per cent for electricity generation and distribution and 70 to 75 per cent for gas distribution as a measure of the ratio between the two (though one of them indicated his *LRMC*

[5] The presence or absence of increasing returns in public utilities depends on the dimension along which output is increased. The extension of electricity and gas service to less densely populated areas is probably subject to increasing transmission costs, as is making telephone service available to additional subscribers, the latter because the number of interconnections grows geometrically as the number of subscribers grows arithmetically. See [24, p. 369] and Troxel, in [19, pp. 179-82]. But all these are subject to markedly decreasing costs with increasing intensity of use.

[6] According to Kendrick's estimates, the average annual growth of total factor productivity, 1899 to 1953, was 3.6 per cent in communications and public utilities, as compared with 2.2 per cent in mining, 2. 0 per cent in manufacturing and 1.7 per cent in the entire private domestic economy [13, pp. 136-37]. This technological progress has by no means been independent of the sharp increase in the demand for the services of these industries.

[7] This discrepancy is offset by (a) inflation and (b) the gradual erosion of this historical rate base by allowance for depreciation. As for the former, it is interesting to discover that, despite inflation, the capital cost for complete new power stations, per kilowatt of electricity sent out, dropped in the United Kingdom from £ 67 to £ 37 between the early 1950s and 1963, as the average size of the generating units newly installed rose from 30 to 550 megawatts [20, p. 49 n]. And that the book investment cost per circuit route mile of the Bell System's long lines declined from $217 in 1930 to $158 in 1940 and $25 in 1965. Backup data for [10, Chart 4], supplied by A. T. & T. See also [19, pp. 11-12].

estimate excluded *net* return); for railroads the estimates range around 75 to 80 per cent [4, pp. 17 n., 401 n., 327, 342-43] [9, p. 452]. In these circumstances, an insistence that peak users pay all capacity costs (reckoned as average total historical costs), or any other device that tries to discourage overinvestment may, by reinforcing any tendency of the companies themselves to underestimate either demand elasticity or the possibility of increasing returns, produce far more harm than the A-J-W effect.[8]

Perhaps the guarantee of a rate of return in excess of the cost of capital, where regulation is effective (so that there remains a reserve of unexploited monopoly power that can be tapped to cover losses on incremental investment) —the very source of the A-J-W distortion—is a necessary offset to the restrictive effects of monopoly. This does not mean it is unimportant for regulatory commissions to subject competitive rates to the test of marginal costs, as the I.C.C. has been urged to do[3] and as the F.C.C. ought to do in its current general rate investigation of A. T. & T. [1, pp. 1063-66]. On the contrary, the A-J-W effect is probably the more powerful of the two distortions in such situations, because in competitive markets the greater elasticity of demand for the services of the regulated company reduces the danger of monopolistic erstriction. But it does mean that the application of any general rules, like the one proposed by Klevorick, aimed at weakening the incentives for incremental investment, could do more (dynamic) harm than (static) good.

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[8] Economic efficiency would still require of course that peak users pay marginal capacity costs. But where the marginal is below the average, the recoupment of the difference is best done by price discrimination; and this could well dictate recovering some of the charges from off-peak customers. See [4, pp. 358-60], [22, p. 420] and [26, pp. 36-37].

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## Concentration and Labor Earnings: Comment

In the March 1966 issue of this *Review* Leonard W. Weiss [7] reports that "Unions which organize their entire jurisdictions seemed to raise [annual] earnings by 7 to 8[1] per cent for craftsmen and 6 to 8 per cent for operatives, compared with poorly organized industries. . . . [Unionism] was certainly the

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[1] The effect, as measured by Weiss, is actually 8-15 per cent. This is a correction which H. Gregg Lewis and Weiss have called to my attention. It was reported incorrectly at 7 to 8 per cent in his article [7].

most difficult variable to estimate. . . ." [7, p. 115]. Weiss also argues that interindustry differentials are insignificant once personal characteristics are accounted for.

The primary purpose of this note is to present clearer evidence on the magnitude of the effect of unions on annual earnings of their members after accounting for differences between members and nonmembers in personal characteristics such as age, education, occupation and the like.[2] Further, broad interindustry differentials which relate to different concentration levels are found to remain economically significant even after accounting for personal characteristics.

The data for the following analysis are from the 1966 Survey of Consumer Finances, which is a national sample of families gathered by the Survey Research Center of the University of Michigan. For a more detailed description of this sample see [6]. Family heads with the following characteristics were excluded from the analysis: female, self-employed, farmers, retired, permanently disabled, students, and college graduates. The rationale for such exclusions is as follows: the effect of sex and the possible associated discrimination is a complex topic of analysis in its own right which would go beyond the scope of this presentation; self-employed and farmers present problems in the measurement of earnings; retired, disabled, and students are not considered to be in the labor force; college graduates would make the population under analysis subject to much greater heterogeneity[3] and hence require additional specifying assumptions for a regression model (for example, an interaction term between age and education) as can be seen from the work of Morgan, David, Cohen, and Brazer [5, p. 63]. The sample thus described consists of 1,111 persons.

Table 1 presents a "dummy" variable regression of earnings on numerous personal characteristics as well as on union membership and industry. Many of the personal characteristics have effects similar to those reported by Weiss [7, p. 106-107]. That is, for example, education, weeks worked, and hours per week have positive effects whereas residence in the South has a negative effect.

Regarding the effect of unionism on earnings which Weiss reports as declining when personal characteristics are included, the analysis here suggests that for this sample the introduction of personal characteristics increases the effect of unionism.[4] That is, in a univariate sense the difference between union and nonunion members is $7046-$6384 or $662, but in a multivariate analysis it

[2] In the analysis of individuals' earnings such as this and Weiss' it is difficult to introduce market factors, such as elasticity of demand for the product being produced, which can alter the potential effect of unionism or short-run quasi-rents of "scarce" labor.

[3] It is interesting to note that of the 173 college graduates (B.A. or advanced degrees) who were male, in the labor force, not self-employed or farmers, only 9 were union members.

[4] An examination of the interrelations among the explanatory variables, for which the multiple regression adjusts, indicates, for example, that union members tend to be in less skilled occupations (even after excluding the college graduates and self-employed). Had college graduates been included in the sample, the increase would have been even greater, but for more narrowly defined groups (see Table 2) the effect of union membership decreases after adjustments for personal characteristics. The point is that on the individual level only the multivariate analysis is appropriate and requires a well measured unionism variable.

TABLE 1—HEAD'S ANNUAL EARNINGS[a] FOR SELECTED LABOR FORCE SAMPLE

| Definition | Coefficients for Independent Variables[b] (in order of their explained variance) | | |
|---|---|---|---|
| | Number of Heads | Average Earnings (univariate) | Average Earnings (multivariate) |
| **Occupation** | | | |
| Professional, technical, kindred | 72 | $8439 | $7579 |
| Non-self-employed managers | 115 | 9502 | 8673 |
| Clerical and sales | 126 | 7460 | 7360 |
| Craftsmen, foremen, and kindred | 324 | 6874 | 6727 |
| Operatives | 281 | 5947 | 5950 |
| Laborers and service workers | 165 | 4228 | 5530 |
| Government and other | 28 | 5908 | 5972 |
| **Weeks Worked** | | | |
| None | 2 | $    0 | $1453 |
| 1–13 | 9 | 1024 | 1562 |
| 14–26 | 18 | 2891 | 3591 |
| 27–39 | 65 | 4180 | 5269 |
| 40–47 | 211 | 6504 | 6537 |
| 48–49 | 310 | 7724 | 7237 |
| 50–51 | 389 | 6812 | 6764 |
| 52 | 107 | 6092 | 6759 |
| **Education** | | | |
| 0–5 grades | 65 | $3833 | $5430 |
| 6–8 grades | 221 | 5431 | 5943 |
| 9–11 grades | 251 | 6421 | 6551 |
| High School | 216 | 6652 | 6523 |
| High School and Training | 168 | 7454 | 7002 |
| College, no degree | 190 | 8690 | 7924 |
| **Age** | | | |
| Under 25 | 83 | $4803 | $5016 |
| 25–34 | 272 | 6274 | 6061 |
| 35–44 | 271 | 7476 | 7088 |
| 45–54 | 272 | 7165 | 7233 |
| 55–64 | 184 | 6383 | 6887 |
| 65 or over | 29 | 5056 | 6242 |
| **Industry** | | | |
| Agriculture and forestry | 29 | $2954 | $6148 |
| Mining and extracting | 14 | 7102 | 7505 |
| Manufacturing | 385 | 7213 | 7239 |
| Construction | 127 | 6001 | 6841 |
| Trans., comm., utilities | 123 | 7092 | 6898 |
| Retail and wholesale trade | 139 | 6488 | 5550 |
| Finance, ins., real estate | 35 | 9353 | 7970 |
| Services | 96 | 6050 | 6103 |
| Government (federal, state, local) | 123 | 6029 | 5952 |
| Industry not ascertained | 40 | 6632 | 6138 |

TABLE 1—*(continued)*

| Definition | Coefficients for Independent Variables[b] (in order of their explained variance) | | |
|---|---|---|---|
| | Number of Heads | Average Earnings (univariate) | Average Earnings (multivariate) |
| **City Size** | | | |
| Central cities (12 lgst. SMSA's) | 143 | $7308 | $7214 |
| Cities 50,000 or over, except 12 lgst. | 218 | 6663 | 6819 |
| Urban places (10,000–49,999) | 201 | 6866 | 6332 |
| Urban places (2500–9999) | 278 | 7488 | 7430 |
| Rural, in an SMSA PSU[c] | 79 | 7182 | 6784 |
| Rural, not in an SMSA PSU | 242 | 4916 | 5706 |
| **Union Membership** | | | |
| Member | 467 | $7046 | $7250 |
| Non-Member | 644 | 6384 | 6235 |
| **Hours Per Week** | | | |
| 1–19 | 15 | $2586 | $6288 |
| 20–34 | 15 | 4290 | 5401 |
| 35–40 | 477 | 6222 | 6269 |
| 41–48 | 292 | 7133 | 6730 |
| 45–59 | 200 | 7122 | 7058 |
| 60 or more | 112 | 7350 | 7672 |
| **Region** | | | |
| Northeast | 263 | $7231 | $6800 |
| North Central | 322 | 7149 | 6873 |
| South | 314 | 5383 | 5992 |
| West | 202 | 7109 | 7178 |
| **Supervise** | | | |
| Yes | 363 | $7965 | $7115 |
| No | 743 | 6016 | 6438 |
| **Hours Per Year on Second Job** | | | |
| None | 958 | $6731 | $6704 |
| 1–199 | 49 | 7445 | 6298 |
| 200–399 | 29 | 5748 | 5849 |
| 400–599 | 23 | 6174 | 6611 |
| 600–799 | 5 | 7022 | 7602 |
| 800–999 | 4 | 8200 | 6609 |
| 1000–1499 | 15 | 6624 | 6220 |
| 1500–2000 | 3 | 8167 | 7244 |
| Not ascertained | 25 | 5464 | 6760 |
| **Race** | | | |
| White | 991 | $6952 | $6719 |
| Negro | 99 | 4181 | 6208 |
| Puerto Rican | 18 | 4371 | 5928 |
| Oriental | 1 | 9500 | 8538 |
| Other | 2 | 5140 | 6589 |

TABLE 1—(continued)

| Definition | Coefficients for Independent Variables[b] (in order of their explained variance) | | |
| --- | --- | --- | --- |
| | Number of Heads | Average Earnings (univariate) | Average Earnings (multivariate) |
| $R^2 = .335$ | | | |
| Annual Earnings Mean = 6662 Std. dev. = 3911 | | | |

ᵃ Defined as wages, salaries, overtime, bonuses, or commissions before taxes or other deductions.

ᵇ In the following regression, the usual standard errors are not reported. However, for a subgroup of 25 the approximate standard error for a difference from the mean ($6662) is $641. For subgroups of 50, 100, and 500 the approximate standard errors are $454, $320, and $143, respectively (these estimates apply to the multivariate analysis).

ᶜ Primary Sampling Unit of the SRC sample.

increases to $7250-$6235 or $1015—relative differences of 10 and 16 per cent, respectively, which are comparable to Lewis' estimate of 10-15 per cent in the late 'fifties [2, p. 193].

In the current study, industry was measured in a much less refined fashion. As in Weiss' study the effects of industry do decline considerably in the presence of personal characteristics, but, subject to the qualification of some relatively small subgroup sizes, here they appear to be associated with concentration in economically significant magnitudes. That is, the coefficients for service, retail and wholesale, and agriculture and forestry industries are considerably below the overall mean, whereas those for mining, manufacturing, and transportation, communication, and utilities are considerably above the mean. However, given the generality of the industry measure, it is not clear whether and to what extent concentration per se or, for example, relatively unattractive work and working conditions related to employment in certain concentrated industries is the explanation for these higher money earnings.[5,6] Another distinct possibility for high wages in concentrated industries is suggested by Alchian and Kessel [1, pp. 70-81].[7]

[5] For a converse example, in the "higher education industry" faculty members forgo money earnings for relatively attractive work and working conditions even after adjustments for consulting income, weeks worked per year, and average hours per week are accounted for [3].

[6] Since the study did not measure industry in detail, neither an explicit measure of concentration nor, by implication, a cross-product between unionism and concentration seemed appropriate. Given the precision with which these variables are usually measured, the introduction of a cross-product term may be going beyond the "data constraint." For a discussion of concentration ratios, see [4] or the appendix to [7].

[7] Assuming much of what is defined as "congenial" or socially acceptable in employees was not measured by personal characteristics included in the analysis.

TABLE 2—PER CENT UNIONIZED AND RELATIVE EFFECTS OF UNIONISM ON ANNUAL
EARNINGS FOR FIVE BROAD OCCUPATIONAL GROUPS

| Group | N | Per Cent Union | Mean Earnings | Relative Effect | $R^2$ |
|---|---|---|---|---|---|
| Operatives | 281 | 66 | $5947 | 26 | .45 |
| Craftsmen | 324 | 50 | 6874 | 24 | .39 |
| Laborers | 165 | 34 | 4228 | 52 | .57 |
| Clerical and sales | 126 | 25 | 7460 | 18 | .29 |
| Professional, technical, Non-self-employed managers, Govt. and other | 215 | 15 | 8678 | −8[a] | .14 |

[a] The union members earn $584 less than the overall mean, *cet. par.* The approximate standard error of this difference is $1016. The nonunion members earn $102 more than the overall mean, *cet. par.* The approximate standard error of this difference is $428.

To test the hypothesis that groups of labor which are more highly unionized will have greater wages, accounting for personal characteristics *and* union membership, the total sample was divided into occupational groups, which are differentially unionized. In the sample, operatives are 66 per cent unionized; craftsmen, 50 per cent; laborers, 34 per cent; and clerical and sales, 27 per cent. The professionals, non-self-employed managers, and a small number of government and other employees were pooled together to form a fifth "occupation." This most skilled group in the sample is 15 per cent unionized. Table 2 presents the relative effect of unions on annual earnings as determined by a regression analysis using the same variables as in Table 1 (occupation was excluded as a variable for all groups except, of course, the professional, technical, and government and other group comprised of three occupations).

The evidence in Table 2, with the exception of laborers, is consistent with Weiss' general belief that the percentage of a group of labor which is unionized has an important effect on the relative effect of unionism over and above union membership per se. However, it appears that within certain broad occupations the relative difference between union and nonunion members' annual earnings after accounting for personal characteristics is greater than from Weiss' estimates. For craftsmen, the relative effect is 24 per cent whereas Weiss' reported effect of unionism in this occupation is 8 to 15 per cent. In a similar fashion the 26 per cent relative effect of union membership for operatives is over three times Weiss' reported effect of 6 to 8 per cent.

The measurement of 18 per cent for clerical and sales workers and no (statistically) measurable effect for the group of professionals, non-self-employed managers, and government and other contrasts markedly with the effects for craftsmen, operatives, and laborers. Although these large interoccupational differences appear to be related to the fraction of the particular occupation which is unionized, this does not rule out the potential effects of variables not measured in this study, such as governmental regulation, geographical labor market concentration, and craft versus industrial unionism.

This analysis implies that, in the presence of adjustments for personal characteristics, unionism has an important effect on money earnings, particularly

for craftsmen, operatives, and laborers. The essential difference between this analysis and that of Weiss is that we have measurements of all the variables on the microeconomic level. Assigning variables (such as unionism) to whole subgroups of individuals from aggregated data will generally result in errors in measurement.[8] Consequently, if the assigned variables are correlated with other variables measured on the microeconomic level subject to less measurement error, when these other variables are introduced into the regression the measured effects of the assigned variables can differ markedly from their true effect.

In addition to the question cf unionism and money earnings, from Weiss' and other analyses it is often unclear whether proper measures of perquisites would imply that money earnings understate or overstate the effect of unionism. In this regard a regression analysis suggests that union members have slightly *longer* annual vacations (by .19 week or about 1 day) in comparison with nonmembers after accounting for other characteristics such as income, age, and education.[9]

Of those in the sample who were 35 or older, only 22 per cent had private pensions *and* were able to report the monthly value in dollars. Subject to the qualification that a "self-selected" sample of this nature is liable to be biased, the union members report a somewhat *smaller* expected monthly pension.[10] From these two tests on vacations and pensions it remains unclear whether unions generally tend to gain greater perquisites for their members.

As a final comment to support the contention that union members have higher wages (or more generally, net advantages) than others with comparable personal characteristics, one can hypothesize that union members should be less likely to change jobs, *ceteris paribus*, than nonmembers. This is because alternative jobs without union membership may pay less and because changing jobs could entail the loss of membership. To the extent that job changes are related to geographic mobility, union members have moved less recently to their county of current residence than non-members.[11]

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## Concentration and Labor Earnings: Reply

The combination of union membership information with data on personal characteristics in the new Survey of Consumers Finances is a welcomed addition to information in an area where official data-collecting agencies have been woefully laggard. It appears from Frank Stafford's note that union membership may have a far greater impact on earnings than my own and other studies based on aggregative measures of unionism have suggested. However, his terribly broad "industries" (such as "manufacturing" or "retail and wholesale trade") leave his results open to some question.

Since the main concern of my article was with the effect of industrial concentration, I published only a limited portion of my information on the effect of unionism and made the remainder available in a multigraphed appendix. Table I shows a more complete set of results selected for comparison with Stafford's study. The passages quoted by Stafford referred to the regressions for construction, manufacturing, and mining where I thought that the concentration data were more meaningful than in the regulated fields. Mr. Stafford's data include all sectors, so his results should probably be compared with the last two columns of Table 1 which cover observations from both regulated and unregulated industries. Estimates are shown for low and high CCR (corrected concentration ratios [2, p. 101]). My results in the three production-worker categories are roughly in line with those in other studies [1, Ch. 5] but strikingly lower than Stafford's.[1] My results for clerical workers differ (in a plausi-

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[1] Both Stafford and I used annual earnings as the dependent variable, but as I pointed out in my paper, the allocative effect of unionism may best be measured by studying its effect on wage rates [2, p. 110]. I have re-run my regressions for male operatives in manufacturing with estimated average hourly earnings dependent. High collective bargaining coverage seems to yield a 22 per cent advantage in average hourly earnings when CCR is 20 and an 11 per cent advantage when CCR is 60. It may be that both Stafford and I understate the allocative effect of unionism therefore.

TABLE 1—EFFECTS OF UNIONISM ON EARNINGS

| Occupation | Percentage Income Advantage of Union Members over Nonmembers. [Stafford, Table 2] | Percentage Income Advantage of Workers in Industries with High Collective Bargaining Coverage ($U=90$) over those in Industries with Low Collective Bargaining Coverage ($U=50$). [2, Table 5 and multigraphed appendix] | | | |
|---|---|---|---|---|---|
| | All Industries | Unregulated Industries | | Regulated and Un-Regulated Industries | |
| | | CCR=20 | CCR=60 | CCR=20 | CCR=60 |
| Craftsmen | 24 | 8 | 15* | 14 | 9 |
| Operatives | 26 | 6 | 8 | 10 | 14 |
| Laborers | 52 | 2 | 45 | 13 | 15 |
| Clerical and Sales | 18 | — | — | — | — |
| Clerical (Female) | — | −9 | +6 | −8 | +6 |

* This was erroneously reported at 7 per cent in my original article [2, p. 115]. The error was in my arithmetic rather than the underlying coefficients from which these percentages were derived. I am grateful to H. Gregg Lewis for pointing out the error.

ble direction) from his because mine refer to females and his, to males. I have no results for his "others" category.

The differences between Stafford's results and mine may be attributable to (a) differences in accuracy of measurement (b) differences in concept and (c) differences in the explanatory model.[2]

(a) Stafford's union membership variable should be more accurate than my collective bargaining coverage variable on two counts. My basic data, like those used in any other estimate of collective bargaining coverage, are unavoidably rough. It is extraordinary that no Census of Manufactures or Annual Survey of Manufactures has ever included the simple and highly useful question "Are 50 per cent or more of the production workers in this establishment covered by a collective bargaining agreement?" Moreover, my estimates of collective bargaining coverage are weighted averages covering the whole of Census of Population "industries" which often include a number of economic markets. To the extent that collective bargaining coverage differs from one market to the next, these averages are bound to be wrong for some of the individuals observed. As I said in my article [2, p. 115], such an error in my unionization variable should bias the coefficient relating unionization and earnings downward.

[2] Our studies also differ as to (d) date and (e) universe, but I have the impression that neither can be important in explaining the differences in our results. (d) His earnings data are for 1965 and mine are for 1959. The relationship between unionism and earnings does not seem to have changed much during the intervening period, but the relatively prosperous conditions in 1965 compared with 1959 might be of some importance. (e) Stafford included trade, service, and government sectors which I left out, but there are few craftsmen, operatives, and laborers in these fields. I included some persons who were not heads of household but I also controlled for being "in school" and for not being "principal source of support for the family" so our overall results should not differ seriously on this count either.

(b) Union membership and collective bargaining coverage differ conceptually, though they would surely be correlated for the economy as a whole. The mere fact that an individual belongs to a union cannot have much effect on his earnings. It is difficult to believe that a farmer who is a union member will earn more than a nonunion farmer or that a nonmember steelworker will earn less than a union steel worker. What counts is (1) the extent of union membership within a worker's place of employment and (2) the extent of collective bargaining coverage among the firms with which his employer must compete. The former would be some indicator of ths ability of the union to influence the terms of employment set by the employer, while the second would be an important element in determining the power of a union in an organized plant to raise wages. Presumably most union members are in organized plants, so union membership would be a good proxy for the first variable. On the other hand, there are many industries with substantial numbers of both union and nonunion plants, so union membership would not be a very good proxy for the extent of unionism within the industry. My collective bargaining coverage variable was a direct attempt at variable (2).

It may be that the difference between Stafford's results and mine reflect the difference between the impacts of variables (1) and (2). If so, plant organization seems to make much more difference, and the extent of industry collective bargaining coverage seems to make less difference than I suspect most observers would have guessed. Moreover, since the full impact of unionism is the combined effect of variables (1) and (2), and since neither he nor I was able to include fully both of these, Stafford's estimates of the impact of unionism should, if anything, understate the true relationship!

(c) Stafford controls for most of the personal characteristics that I did, but he does not really control for industry characteristics such as plant size or employment growth and neither of us could get at many crucial personal traits. The introduction of dummies for such broad groupings as "manufacturing" or "wholesale and retail trade" cannot possibly capture the effect of these factors. The Census of Population industries which I used such as "motor vehicles and equipment" or "grain mill products," while often not economic markets, had considerable internal homogeneity with respect to the important industry variables, certainly much more so than Stafford's. I suspect that some of the earnings difference that Stafford attributes to unionism is actually due to other industry characteristics. If so, this implies that the virtual disappearance of the effect of industry variables other than unionism that I observed after personal characteristics were introduced was partly due to the inaccuracy of my measures of industry characteristics. Presumably industry characteristics do decline in importance as personal characteristics are taken into account, but, as I pointed out in the original article [2, p. 116], it may be that the influence of industry characteristics would not entirely disappear if they were more accurately measured. At the same time, by making unionism a personal characteristic, Stafford probably picked up the effect of many important personal traits such as skill, intelligence, and responsibility which our age and education variables measure imperfectly [2, p. 116]. These must vary widely within occupations as broad as "craftsmen" or "laborers," especially when

employees of government and of gas stations are included with steel workers. If, as I believe, there is a positive correlation between labor quality and unionism among production workers, Stafford's results are as apt to exaggerate the effect of unionism as mine are to understate it.

In view of the very broad industries that Stafford had to use, I do not feel that his results call for any change in my conclusions regarding the effect of concentration on earnings. I believe that it is meaningful to compute weighted averages of concentration ratios in Census of Population industries and to characterize one as more concentrated than another, but I find the degree of concentration of "manufacturing" very close to meaningless. At any rate, dummy variables for broad sectors such as "manufacturing" must reflect *all* the characteristics of those sectors at once—employment growth rates, stability of employment, establishment size, character of overall labor force, and type of work as well as concentration. It seems unlikely that such differences between sectors in industrial concentration as may be identifiable would be great enough to overwhelm these other characteristics in their effects on employment and earnings. My paper showed the effect of concentration disappearing once personal characteristics were introduced. I find no reason to change this conclusion on the basis of Stafford's paper.

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## Railroad Social Saving in Nineteenth Century America: Comment

Mr. E. H. Hunt in a recent issue of this journal has attempted to assess the meaning of Professor R. W. Fogel's estimate of 5 per cent as the social savings of railroads in the American economy. Unfortunately, he has made several serious mistakes in attempting to assess, *over time,* the contribution of railroads to the American economy. With Hunt, I will assume a 4 per cent growth rate in the American economy and accept Fogel's 5 per cent as the social savings of the railroad. In the table below the columns are (a) the economy with the railroad, (b) the economy with the railroad but the railroad out of use for one year, and (c) the economy without railroads.

Table 2 below is a reproduction of Mr. Hunt's table. [ (a) is the railroad economy, (b) is the railroad economy with a one year's loss of the railroads, and (c) is the economy without railroads.]

Compare column b in Tables 1 and 2; in Table 1 a 5 per cent loss to the economy is regained in year 2 when the railroads start operating again plus the

TABLE 1—GNP:

RAILROAD SOCIAL SAVING OF 5 PER CENT; 4 PER CENT GROWTH RATE
(rounded off to nearest hundredth).

| Year | a | b* | c |
|------|-----|--------|--------|
| 1 | 100 | 95 | 95 |
| 2 | 104 | 103.8 | 98.61 |
| 3 | 108.16 | 107.95 | 102.36 |
| 4 | 112.48 | 112.27 | 106.25 |
| 5 | 116.98 | 116.76 | 110.28 |

* Column b in year one is a gross underestimate of the effect of a closure of railroads in a railroad economy. Fogel assumed that in a non-railroad situation alternative transportation would eventually be developed which would cost society 5 per cent more resources to transport than railroads; he did not assume that if we eliminated railroads overnight alternatives would be immediately developed which would cost the economy only 5 per cent of total resources. However, for the sake of the argument I have retained Hunt's assumption that an overnight elimination of railroads would cost 5 per cent of gross national product.

TABLE 2—GNP

| Year | a | b | c |
|------|-----|--------|--------|
| 1 | 100 | 95 | 95 |
| 2 | 104 | 98.8 | 93.8 |
| 3 | 108.16 | 102.75 | 92.55 |
| 4 | 112.48 | 106.86 | 91.25 |
| 5 | 116.98 | 111.13 | 89.9 |

normal growth rate (4 per cent of the previous year's income). A simple analogy would be that of a bridge across a river. If the bridge is closed and it costs 5 per cent more to transport goods, a reopening of the bridge will reduce costs once and for all by 5 per cent. The case for an economy which closes down its railroads for one year is analogous except that we would expect that economy would continue on its long term trend also. In Table 1 columns (a) and (b) converge much more rapidly than in Table 2 simply because Hunt failed to add the social savings of railroads after he permitted them to run again.

Column (c) in Table 1 is the growth rate of the economy without railroads. I assume the "normal" rate of 4 per cent growth in GNP in the nonrailroad society is reduced because 5 per cent of every increase in output must be devoted to transportation; that is, because of increased costs (assumed to be 5 per cent) output will grow more slowly. If the economy were to grow with railroads at 4 per cent per annum, then, according to our assumption, without railroads the economy will grow at 3.8 per cent, the other .2 per cent being devoted to transport costs which would not be needed if railroads had existed. In Table I (a) and (c) are both growing but (a) is growing at a faster rate than (c). Given time, economy (a) will be much greater than economy (c).

In Table 2, column (c), Hunt has added a growth rate of 4 per cent of GNP and then subtracted 5 ($GNP_n + 4\% \, GNP_n - 5 = GNP_{n+1}$). According

to this method GNP is decreasing at an increasing rate, eventually it will reach zero and become negative. The error is that Hunt subtracted 5 (not 5 per cent of the change) from GNP. Following Hunt's reasoning, if the original GNP were 200 rather than 100, we would have GNP increasing at an increasing rate.

Table 1 is the relevant table for comparison between a railroad and a non-railroad economy [columns (ε) and (c) respectively]. Because of an increase in costs, the growth rate of economy (c) will be less than that of (a); the divergence of the two economies will increase at an increasing rate over time.

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## Railroad Social Saving: Comment

The introduction by Robert W. Fogel of the concept of social saving into the world of the economic historian has formulated a revolution, the results of which certainly have not been fully digested [2]. Fogel calculated the social saving (the flow of income from the resources freed by an innovation, expressed as a percentage of national income) for the railroad in 1890. This he accomplished by comparing the actual situation, favored with the railroad, with a hypothetical alternative of the economy, deprived of the "iron horse" but adjusted to the next-best alternative. He found an optimistic social saving of 6.3 per cent due to the presence of the railroad but considered a figure of less than 5 per cent to be more realistic [2, p. 223].

This raises the question of the significance of this finding. Does 5 per cent represent a large or a small number? Fogel was specifically testing the hypothesis that the railroad was indispensable to American economic growth. He clearly believed that this figure, calculated at the peak of the railroad's influence, demonstrated that it was not. (Furthermore, if we read Fogel correctly, he never implied that the railroad was unimportant, as often alleged—only that significant growth could still have occurred in its absence.) It however appears to remain for the reader to agree or disagree, since there exists no objective cutoff between dispensable and indispensable.

Recently E. H. Hunt, in this *Review*, raised the question of interpreting Fogel's findings [5]. He concludes that the correct interpretation of the social saving attributed to the railroad would support the traditional view of the railroads' significance. Even though Mr. Hunt's analysis has been challenged in the note immediately preceding this one, the question that he raised is real enough. In this note we tentatively offer an alternative way of evaluating the significance of Fogel's findings. We suggest that one could proceed by asking a

related but different question: Was the railroad, for instance, more or less important than other innovations? Thus we should compare social savings. We might expect that, had the railroad been truly indispensable, its social saving would be larger than that attributed to other less spectacular innovations. Should it prove otherwise, then either there were other indispensable innovations or the railroad was not. Should the railroad's social saving be larger than any other, we can say only that it contributed more to increasing national income than did these other innovations.

There are several a priori reasons why we should expect a social saving of about 5 per cent to be relatively high. It is, after all, a once-and-for-all improvement in national income equivalent to about 15 months' economic growth [2, p. 47]. Also we would expect that the significance of any innovation would be proportional to its effectiveness in reducing costs and to the importance of the sector it influences in national output. In both cases the railroad scores rather well. Fogel's results suggest that the cost in 1890 of interregional transport of agricultural goods that went over the railroad would in its absence have doubled [2, pp. 211]; also, the transportation sector which the railroad dominated comprised about 12 per cent of national income [6, Series F39]. It would appear from these arguments unlikely for any other single innovation (i.e., confined to one sector) to surpass the contribution of the railroad.

Indeed, this is what the few other existing studies of social savings suggest. We have found four roughly similar estimates that we feel are directly comparable to Fogel's. These relate to the social saving attributed to the expansion into the Canadian prairies made possible by the chilled-steel plow and red fife wheat [1], to the introduction of the steam-powered ocean vessel [4], to the development of hybrid seed corn [3], and to agricultural research in general [3]. These, along with Fogel's famous number, are reproduced in Table 1.

Chambers and Gordon measured the contribution made to Canadian national income by the expansion into the prairie provinces, their aim being to subject the "staple thesis" to empirical test. They asked the question, What would Canadian national income have been in the absence of the innovations that allowed settlement and profitable wheat production in the prairie provinces? The model they developed implies that the proper measure of the economic contribution of these innovations that led to the famous Canadian wheat "boom" is the rent on the land brought into cultivation. This amounts in 1911 to 1.94 per cent of Canadian income [1, p. 320], which is considerably less than Fogel's calculation for the American railroad in 1890.

Another study which more closely follows Fogel's methods is Gerald Gunderson's study of the social saving attributable to the steamship in the nineteenth century. Using as his counterfactual proposition a world without the steamship but with the sailing ship, Gunderson presents evidence that the freight costs in international trade would have risen 53 per cent in the absence of the steamship, but that the C.I.F. prices would have increased only 4.0 per cent [4, p. 96]. Since the international trade sector is only a small part of national income (exports 7.4 per cent of GNP, imports 4.3 per cent, in 1897-1901) [6, Series U45, U46], this amounts to less than a quarter of 1 per cent of national income.

TABLE 1—"SOCIAL SAVINGS" OF VARIOUS INNOVATIONS

| Innovation | Year | Estimate as Percentage of GNP |
|---|---|---|
| 1. Introduction of railroad in United States | 1890 | 5.0 |
| 2. Red fife wheat, chilled steel plow—Canada | 1911 | 1.96 |
| 3. Steamship in international trade (United States) | 1900 | 0.25 |
| 4. Agricultural research in United States | 1951 | .29–1.6 |
| 5. Hybrid seed corn in United States | 1955 | .06 |

*Sources*: [2, p. 223], [1, p. 320], [4, p. 96], [3, p. 428], and [3, p. 424] for ranks 1, 2, 3, 4 and 5 above, respectively.

A third estimate, Griliches' study of the social return to the development of hybrid seed corn, is not strictly comparable. Griliches was interested in estimating the costs of return to investment in research, and his estimates consequently are biased downward. Nevertheless, his methods follow closely those employed by Fogel, Chambers and Gordon, and Gunderson. Griliches arrived at a net social return of $248 million annually after 1955 [3, p. 424]. This amounts to less than .06 of 1 per cent of national income.

Griliches also produces evidence that would allow a calculation of a rough social saving deriving from agricultural research for the years 1940-1950. His figures show a gross social saving between $1,110 million and $5,430 million [3, p. 428]. Deducting the annual average cost of research of $141 million, the range of net social saving is $969 million to $5,289 million. Since gross national product was $329 billion in 1951, the social saving on agricultural research amounts to between .3 and 1.6 per cent of national income for that year.

It is clear that comparing Fogel's figure with but four other estimates is like deciding an election on the returns of the first four precincts counted. The value of the decision depends upon the representativeness of the precincts selected. A reasonable case can be made that in fact these four estimates will prove to be fairly representative; if so, then we shall find that the railroad was relatively a very important innovation. The traditional view of the iron horse was, perhaps, fairly close to facts—but then, all the returns are not yet in.

<div align="right">

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# Railroad Social Saving: Reply

I am grateful to Professor Coelho for bringing this to my attention—my apologies to Professor Fogel. My statistics confuse change in growth rates with accumulated loss of wealth. The problem of evaluating railroad social saving remains inviolate.

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# BOOK REVIEWS

## Price and Allocation Theory; Related Empirical Studies

*Essays in Normative Economics.* By ABRAM BERGSON. Cambridge: The Belknap Press of Harvard University Press, 1966. Pp. ix, 246. $5.95.

This collection of ten essays contains six that have appeared before, with some revision. They are organized under three headings: Part I on Social Welfare and the Economic Optimum, Part II on Problems of Measurement, and Part III on Socialist Economics.

The first is a great classic, "A Reformulation of Certain Aspects of Welfare Economics." Published under the name, A. Burk, it not only preceded the revival of the welfare economics of Pareto and Barone, as represented in subsequent years in papers by Kaldor, Hicks, Scitovsky, and Lange, but it is unique in displaying the way in which the theorems of welfare economics unfold as increasingly specific formulations of the underlying ethical desiderata are laid out.

The second essay, "Collective Decision-Making and Social Welfare," is a critique of Arrow's General [Im]-Possibility Theorem. One can only smile upon the efforts of so many to exorcise this theorem from welfare economics. This reviewer is not impressed that any of these efforts has succeeded, though a great babel of interpretations has been proliferated. The issues have become so semantically subtle, so involved with the elaboration of nuances of meaning and intent, that it is impossible to comment in a succinct way on any of the continuing discussion.

In an essay "On Social Welfare Once More," written in 1964, and not previously published, Bergson reconsiders the value basis of welfare economics. This essay is essentially reflective, articulating distinctions, and is largely indecisive in tone: qualifications have their qualifications. In considering the Cambridge tradition of Pigou, the author accepts the distinctions between preferences, satisfactions, and individual welfare. But which should enter the social criterion function, Bergson argues, quite correctly, requires a value premise. A fine passage appears on page 65:

> The scope of welfare economics is conventional, but the relevant convention concerns the nature of the causes of social welfare rather than the nature of the states of mind to be considered. Thus, reference is to welfare as this is affected by economic causes, and to economic welfare only in this sense rather than as a category that is necessarily psychologically distinct from noneconomic welfare.

He also denies (properly), in the Pareto tradition, that interpersonal comparisons of satisfactions can be regarded by the welfare economist as a strictly empirical matter, though he does allow (properly) for their meaningfulness.

Thus (p. 65):

> I do not deny that there are minds other than mine; or that one often engages in a mental exercise which is commonly understood to involve comparisons of satisfactions of different people. But the exercise necessarily involves some convention by which the satisfactions of different people are scaled against each other, and for the convention itself there can be no proof.

Part II, concerned with Problems of Measurement, includes a 1936 article on "Real Income, Expenditure, Proportionality, and Ragnar Frisch's *New Methods*" and a 1949 comment on Dr. H. Staehle's dissimilarity method of calculating cost-of-living indexes. Both essays are good and proper criticisms, but I feel the issues discussed now find their place more appropriately in the history of the subject than in current controversy.

A previously unpublished paper, "National Income and Welfare," is much like the essay, "On Social Welfare Once More." It is reflective, outlines problems, identifies many troublesome considerations, all generally obvious, but presents no theorems or even any really meaningful opinion. This essay focuses primarily on virtual changes in income and its distribution rather than on historical changes. This important distinction is amplified by a section on the import of changing tastes.

Another new paper is entitled "On the Appraisal of Indivisibilities." If, in comparing two economic situations, preference for one is not revealed by the index number test, resort may be made to measuring the consumer surplus that differentiates them, as Hicks has proposed, under the assumption that there are no income effects. Bergson shows how income effects may also be taken into account. It boils down to this: If, within the relevant range, one knows the demand functions, one can in principle infer the indifference map, and, now having the indifference map, one can determine whether a given change improves or worsens the household's position. An example of the computation is given for a highly special indifference map. All this strikes me as true, but trite.

Part III of this book is excellent. It contains the superb chapter on "Principles of Socialist Wages" (extensively rewritten) from Bergson's great work *The Structure of Soviet Wages*. It also contains his excellent survey, "Socialist Economics," from the first *Survey of Contemporary Economics*, edited by Howard Ellis, plus a brief "Further Word" providing a 17-year retrospective comment on Soviet planning. Rereading the two main pieces, I can only reconfirm my admiration of them for their lucidity, correctness, and discernment of the relevant analytical issues.

In reviewing a volume such as this, consisting largely of contributions made over the years to a major central topic, Normative Economics, one reviews an important part of the professional work of a distinguished economist. That these essays may strike a given reader as somewhat uneven and, as may be expected, as somewhat passé, is of little moment. I take pleasure in having this volume, where, in one place, Bergson's persistent struggle with the most moti-

vating issues of economics is recorded, and where one may find some contributions that are genuine classics.

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*Monopolistic Competition Theory: Studies in Impact.* Edited by ROBERT E. KUENNE. New York: John Wiley & Sons, Inc., 1967. Pp. x, 387. $8.95.

The essays in this book were written in honor of Edward H. Chamberlin. The book has two objectives: an appraisal of the changes in economic reasoning that have resulted from Chamberlin's work, and the extension of monopolistic competition theory into areas that have proved resistant to it. It succeeds more in the former than in the latter respect. In addition, "Chamberlin vs. Chicago" disputes are renewed—again with inconclusive results.

The book is organized into three parts. The first is entitled "Global Impacts" and includes essays by William Fellner, Nicholas Georgescu-Roegen, Sir Roy F. Harrod, Edward S. Mason, Paul A. Samuelson, and Erich Schneider. Part II deals with "Impacts on Theoretical Fields," with essays by Joe S. Bain, Richard B. Heflebower, Harry G. Johnson, Robert E. Kuenne, Robert L. Bishop, and Jan Tinbergen. Part III is concerned with "Impacts on Geographical and Applied Areas," with contributions by Kurt W. Rothschild, Francisco Vito, E. T. Grether, Karl A. Fox, and David Alhadeff. As is instantly apparent, this is an impressive line-up.

The essays in Part III deal, respectively, with Chamberlin's influence on German and Italian economics, on the marketing literature, and on agricultural and banking markets. These appeal to a somewhat specialized audience. In view of space limitations, I will restrict my comments to the essays in Parts I and II.

Fellner's lead-off essay is one of the highlights of the collection. He develops a theme which appears recurrently throughout the volume: the Chamberlinian contribution was significant not so much because it produced novel results (such as tangency solutions), or because it introduced theoretical tools which have had lasting signification but because it provided a new *weltanschauung*. In both Fellner's view and Bain's, *Monopolistic Competition* supplied the theoretical underpinnings for the field of industrial organization to build on.

Fellner regards efforts to characterize competition according to cross-elasticity of demand as unproductive, and $DD'$-type demand curves as having limited usefulness for oligopoly theory But it is not by performing tests of this sort that he would judge Chamberlin's impact. It is by raising such issues as those examined by Fellner on page 11, matters that are at the essence of antitrust enforcement, that Chamberlinian analysis makes its contribution. On this, however, Fellner's treatment of the tradeoffs between market power and performance comes off somewhat ambiguously.

Georgescu-Roegen distinguishes Boulding-type (quantity) production functions from Stigler-type (flow) production functions and makes a compelling case for the latter. He then examines the conditions which place a limit on op-

timum plant size in a steady-state process for which coordination problems are minimal. Amplifiability, he shows, is subject to elementary laws of matter, and this places a limit on optimum plant size. He regards the optimum firm size question as more formidable, and inquires whether there are "any laws that, just like the laws of matter on the plant, would prevent the management unit from functioning beyond a certain size of plant complex"—a question that, I believe, can be answered in the affirmative.[1]

Harrod reopens the controversy over whether tangency implies excess capacity. He took the position in 1952 that entrepreneurs would anticipate the effects of price on entry and that this would lead them to pursue sustainable policies.[2] Actually, this latter proposition does not strictly follow from the former; whether sustainable policies are in fact attractive involves a tradeoff between present and future net returns. But where permanence is preferred, and given that barriers to entry are absent, tangency *without* excess capacity is the predicted result. The original argument possessed some ambiguities, partly because he failed to supply a geometrical counterpart for his verbal description. Both conditions are remedied in the present essay; the case for tangency without excess capacity (in any meaningful sense) on the downward sloping portion of the firm's long-run average cost curve is made convincingly. The tradeoff question, however, is nowhere explicitly raised.

Mason makes one of the few attempts to use monopolistic competition theory to address a current policy issue—an undertaking which he performs successfully. He distinguishes Chamberlinian from Schumpeterian organizations in examining the growth process in less developed countries. The traditional sector he characterizes as rural, unprogressive, and organized along Chamberlinian (large group) lines, while the modern industrial sector is urban, rapidly growing and displays Schumpeterian properties. Spacial isolation (by reason of lack of transportation, nonstandard products, and imperfect labor mobility) render many of the traditional markets monopolistic in a Chamberlinian sense. Remedies for these conditions are necessarily long-run. "There is not much within the legislative and administrative competence of governments that can be done about it." By contrast, the industrialized urban sector, which is growing rapidly and displaying responsiveness to market opportunities in a Schumpeterian sense, possesses monopoly properties that are more easily affected. Mason advocates that entry conditions in this class of industry be made easier by improving the capital market and administering industrial and import licensing in a way more favorable to small and medium sized firms. This would have beneficial efficiency effects and would interrupt the process of concentrating wealth that is characteristic in many of these countries.

Samuelson takes as his purpose a discussion of "some of the *theoretical* reasons why perfect competition provides an empirically inadequate model of the real world." Naturally this brings him to renew aspects of the "Chamberlin vs. Chicago" dispute, but his principal target is Marshall. Samuelson's strong

[1] O. E. Williamson, "Hierarchical Control and Optimum Firm Size," *Jour. Pol. Econ.,* April 1967, *75,* 123-28.

[2] R. F. Harrod, "The Theory of Imperfect Competition Revised," in *Economic Essays,* London 1952, pp. 139-87.

preference for general equilibrium analysis doubtlessly reflects a pure theorist's approach to imperfect competition, but as both Bain's and Kuenne's essays reveal, this has not been and may not be the most productive way to develop this area. Samuelson goes on to develop a series of industrial organization theorems and shows that imperfect spatial competition experiences "wastes of free entry" relative to ideal planning. This last, however, suffers from a condition common to much of monopolistic competition theory (as Mason's essay makes evident): operationally it lacks policy significance. He concludes with a proof that replication leads to asymptotic first-degree-homogeneity of the production function.

Schneider's is the shortest and least ambitious essay in the collection. He sketches out the historical antecedents to which *Monopolistic Competition* is related.

Bain's is the first essay in Part II; in it he deals with Chamberlin's impact on microeconomic theory. Like Fellner's chapter, this is an exercise in perspectives and is similarly well done. Chamberlin's principal influence, Bain believes, can be attributed to his emphasis on an empirically relevant view of markets. Bain dismisses Triffin's argument that partial equilibrium analysis should be abandoned in favor of general equilibrium theory with the observation that this would "have insured the relegation of Chamberlinian theory to the category of a major curiosity, and aborted any major exploitation of its potential." Although the large-group (tangency) case has attracted more attention, it is much less significant than Chamberlin's reformulation of oligopoly theory. Here "mutual dependence recognized," a concept since refined by Fellner,[3] was Chamberlin's single most important contribution. Although the formal properties of Chamberlinian models are frequently uninteresting, he finds in Chamberlin's treatment of market problems "a rich source of informal and implied hypotheses." Whether Bain's experience with Chamberlinian theory in this latter respect is typical is at least doubtful, but it is sufficient for its eventual effects to be pervasive that Chamberlinian theory has had immediate effects on such research as Fellner's and Bain's.

Heflebower is concerned with the incentives that influence the ways by which sellers and buyers in a market communicate, and with how market positions are attained and preserved. He advances the important notion that "From past failures and successes, which reflect both differential skill and luck, each firm evolves a 'position' in the market for a product line." From this emerges a firm's capacity to engage in rivalry. This is an attractive proposition, one which Heflebower would like to see built into a theory of markets. But it is not a concept which gives itself easily to analysis. One might nevertheless hope that further effort along these lines would be forthcoming.

Johnson informs us at the outset of his essay that "as a broad generalization, the theory of monopolistic competition has had virtually no impact on the theory of international trade." Inasmuch as international trade theory is, by nature, an exercise in general equilibrium analysis, while monopolistic competition theory is a partial equilibrium construction, this is not surprising. But even more responsible for the exclusion of monopolistic competition concepts

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[3] William Fellner, *Competition Among the Few*, New York 1949.

from international trade has been the past preoccupation with two trade questions that are founded on the assumption of perfect competition: specification of the sense in which free trade can be said to be a welfare maximizing policy, and Heckscher-Ohlin models. More recently, however, Drèze has introduced monopolistic competition concepts into his study of comparative advantage between the common market countries. Similarly Stykolt's and Eastman's work on tariff-induced waste in Canada appears to be promising—although possibly the concept of waste which they employ should be extended from simple production inefficiencies to include waste that reflects managerial preferences and "slack."

Kuenne, the editor of the volume, is concerned with problems of introducing monopolistic competition into general equilibrium theory. Neoclassical general equilibrium theory is concerned strictly with interproduct or intermarket competition in which interfirm competition takes a nonrivalrous form. As he puts it, "the most important innovation of the Chamberlinian revolution was to alter the nature of interproduct competition while retaining the postulational basis for ignoring . . . interfirm competition"—a view that is not widely shared by other authors in the volume, but one which obviously suits the theorist bent on integrating monopolistic competition into general equilibrium theory. Kuenne examines the strong similarities between Marshallian long-run particular equilibrium analysis and Walrasian general equilibrium theory—taking exception to Triffin's contention that Walrasian analysis incorporated, in a meaningful way, extra-economic elements of interfirm competition which Marshall's analysis omitted. He argues that, before efforts to introduce rivalrous interfirm competition into general equilibrium theory are made, interrelated product markets within which nonrivalrous competition prevails should be investigated first. Even this last is an ambitious objective. Although Kuenne treats this subject with skill, the results are meager. The prospects for a fully integrated general equilibrium treatment of rivalrous behavior must, on this rendering, be regarded as dim indeed.

Bishop examines the welfare economics implications of monopolistic competition. He treats the large group case in which the group, relative to the rest of the economy, is small enough to warrant the use of partial equilibrium techniques. In the process he provides a general restatement of the conditions necessary for partial equilibrium welfare analysis to be fully appropriate. He shows that the "curing" of monopolistic competition's supposed inefficiencies through the imposition of a competitive solution involves the overruling of consumer preferences; optimum product variety in a monopolistically competitive regime always involves production at a point where price equals marginal cost in the region where average costs are falling. Although this is not the tangency solution, neither is it the competitive equilibrium. Bishop concludes with a discussion of nonprice competition (product quality, advertising, etc.) which, by virtue of a fixed-price assumption, appears to lack generality.

Tinbergen examines the relations between quantitative economics, macroeconomics, and monopolistic competition. He argues that more has not been done to incorporate monopolistic competition concepts with econometric models because the statistical material required has not been publicly available and

firms would not be willing to release the necessary data to investigators. The latter proposition appears to be gratuitous. Given that assurances of nondisclosure are provided and the merits of the study are made clear, firms are surprisingly cooperative in releasing sensitive data to academics. Such data are time-consuming to compile, however, and may not be available in a strictly uniform way. But presently it is more the reluctance by economists to tap this source than it is the noncooperation by firms that explains the lack of data.

The purpose of the students and contemporaries of Chamberlin who contributed to this volume appears more to have been to honor him for things past than to lay the groundwork for things ahead. On this standard, the volume deserves to be judged a success. But the reader who is interested in substantive research results and new concepts will find the mix rather too heavily weighted in favor of surveys and overviews. The principal thrust of the book and, with a few exceptions, the best essays are those that place monopolistic competition theory in perspective. The essays are less studies in current impact than they are essays in monopolistic competition theory "historically contemplated."

OLIVER E. WILLIAMSON

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*An Essay on Capital.* By ISRAEL M. KIRZNER. New York: Augustus M. Kelley, 1966. Pp. x, 147. $5.00.

As its title implies, Professor Kirzner's brief book is a discussion of certain aspects of traditional capital theory. It does not attempt to develop a rounded theory of capital. Rather it presents a basic point of view about capital and from this point of view evaluates and criticizes existing theories of capital.

Kirzner's fundamental view is that capital goods are intermediate goods that result from earlier planning. Further they will be used in executing plans which may have been made earlier and which may be altered as a result of changed circumstance. Thus multi-period planning is the economic circumstance which gives rise to capital and which provides the context that enables us to understand capital. This certainly sounds harmless or even trivial, but Kirzner contends that it has important implications for capital theory.

As an elementary example of the implications of the planning conception of capital, Kirzner offers the textbook definition of capital, i.e., produced means of further production. On its face this definition is not satisfactory because it ignores planning and concentrates on the physical characteristics and the physical history of the goods in question. The definition is satisfactory only if it is worked into the context of multi-period planning.

Similarly, various theories of capital and theoretical observations about capital come under fire because they do not depend on multi-period planning. Writers such as Haavelmo who emphasize the presence of capital in the productive process rather than its wearing away are rejected. Such a view depends on a thin "time slice" and hence does not have room for multi-period planning. In a purely technological sense, the thin time slice may be valid, but it ignores the element of decision making which can be encompassed only by the multi-period planning approach to capital theory.

Both the Knightian and the Austrian views of capital come under criticism, although for different reasons of course. The Knightian theory with its simultaneity of production and consumption does not employ the notion of multi-period planning and thus eliminates much that is central to capital theory. The Austrian concern with tracing capital back from "stored-up" factors of production to "original" factors of production is also contrary to the emphasis on multi-period planning.

A number of rather interesting discussions of topics related to capital theory appear in the book. I shall mention only two of these. The first is the idea that in economics "bygones are bygones." In particular Kinzner maintains that a theory of production which begins ". . . with a given stock of capital need pay no attention whatsoever to the genesis of these goods." Certainly one may agree that in economics bygones are often bygones, but to elevate this observation to a general principle, as Kirzner appears to do, raises difficulties. Specifically it raises the question of when a bygone becomes a bygone. The modern theories of investment and of the consumption function, for example, suggest that past events have a continuing influence on expectations. Empirically lag patterns may be quite complex and may not be well understood as yet. Like old soldiers, bygones, or their influences, may not terminate abruptly.

Another interesting topic that Kirzner raises is the problem of whether waiting should be considered as a factor of production. It may be remembered that Böhm-Bawerk rejected this idea, while more recently R. Dorfman has espoused it. Kirzner is not so categorical. From a technological viewpoint, he argues, waiting is a factor of production. "Labor and nature alone cannot yield output; labor plus nature plus waiting yield output." On the other hand if production is viewed from an "economic" standpoint, i.e., from the standpoint of multi-period planning, the production function consists of a set of alternative plans for the future. No ". . . input 'sacrifice' in the form of waiting need be taken into consideration . . ." Surely this discussion of waiting as a factor of production is a tempest in a teapot. If we adopt the philosophical view that time is not an independent entity but exists only as events occur, then the mere passage of time has no significance. Time has significance in the production process only because it is a measure of one aspect of the actions that make production possible.

If we want to accept waiting time as a factor of production, then surely we should also accept abstract empty space as a factor of production. To me it is more reasonable to agree that space exists only as objects occupy it. But production requires space just as it requires time. Surely we should be logical and symmetrical. If abstract time is a factor of production so is abstract space.

Kirzner also discusses measurement of capital rather extensively. I shall say nothing about this part of the book except to report that he, quite rightly, sees many difficulties in measuring capital. "Backward-looking" measurements of capital for the individual in the sense of measuring past sacrifices ". . . must be pronounced a failure." "Forward-looking" measurements of capital are ". . . performed whenever an individual buys or sells a capital good . . ." Measurement of aggregate capital is ". . . a wholly artificial construct useful for making certain judgments concerning the progress and performance of the economy."

There can be little doubt that Kirzner's basic point of view is significant in capital theory and enables him to make some interesting evaluations of other theories. But is it the magic wand that makes all mysteries disappear? I doubt it. Surely what Kirzner calls a technological viewpoint may sometimes be more important for economics than what he calls an economic viewpoint. At points throughout the book he seems to be on the verge of agreeing to this; at other points he seems to suggest that his viewpoint is *the* correct one.

Perhaps Defoe should be enshrined as a precursor of certain economists in the same way that Mandeville is of others. What would capital theorists do without Robinson Crusoe? Like Voltaire's God and Samuelson's shadow prices, if he didn't exist they would have invented him long since. Kirzner spends an appreciable proportion of his time in Crusonia. Personally, I wouldn't want to live there and after the first trip it isn't even a very interesting place to visit.

RALPH W. PFOUTS

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*The Framework of Price Theory.* By CLARK L. ALLEN. Belmont, Calif.: Wadsworth, 1967. Pp. x, 373. Text ed. $7.95.

*Microeconomic Theory: A Graphical Analysis.* By RICHARD A. BILAS. New York: McGraw-Hill, 1967. Pp. 307. $8.95.

Both of these books are competently written standard textbooks designed for the intermediate microtheory course and reviewing graduate students. They approximate the size, content, and level of difficulty of Leftwich's well-known text. Bilas' book is no more "graphical" than Allen's. Both rely more than Leftwich upon formal graphical and algebraic treatment but neither, especially Bilas, shrinks from supplementary use of the calculus. Perhaps as a result of this emphasis on neatness, neither has a chapter on income distribution and both view oligopoly as entry-proof having long-run equilibrium "solutions" which depart markedly from any competitive norm. Both books are in the Chamberlinian tradition, emphasizing the practical importance of monopolistic competition and especially oligopoly, rather than noting the pervasiveness of long-run market pressures. Both list supplemental readings which, if mastered, will leave the student well prepared for his general examination in microtheory.

Allen offers many straightforward questions at the end of each chapter. Bilas offers none. Allen uses mathematical relationships, such as elasticity and the relationship between average, marginal, and total cost, as titles to five of his fifteen chapters and concludes with a "Post Postprandium" review of the course, relating it to the various fields of economics. Much of his analysis is cleverly done as one would expect from the author of *Elementary Mathematics of Price Theory,* and co-author of an elementary text. Some will feel that it is overdone. The degree of over-learning implicit in this approach, as developed over eight years of application in the author's classes, is justified if the objective is to teach thoroughly the basic concepts to all who will persevere. Those who teach primarily potential candidates for advanced degrees (and particularly those who have difficulty distinguishing between the junior and the graduate course) will find Allen's book limited in its coverage and overdone in

what it does take up. They may, however, find it useful to recommend to less than well-prepared students in search of a solid foothold in microtheory.

Some points of analysis and avenues of approach may be questioned. Most flow from Allen's eagerness to show the fruitfulness of the analysis by reaching practical conclusions almost instantly in the "postprandia" that conclude his chapters. Others result from the monopolistic competition-imperfect competition framework in virtually its pure form. Two examples of the former include an analysis of the wisdom of the British devaluation made to turn exclusively on the price elasticity of exchange, and the use of the formula $e = a/(m - a)$ to show that the elasticity of demand must be $-2.0$ if the selling price of a product is $200, and "costs of goods" is $100. Nothing is said of capital flight, or capacity to produce in the former case; and the student is left to ponder how the producer under competition with a zero margin over cost of goods pays the light bill. (Bilas reaches, a bit more discretely, the same conclusion.) Allen's dismissal of flat average total cost curves on *a priori* grounds compares badly to Milton Friedman's treatment of the same problem reproduced in *Price Theory*, which Allen cites in other connections. His treatment gives unnecessary and undesirable encouragement to those who would like to believe that valid propositions spring full blown from pure theory, as Athena from Zeus's forehead.

In view of the great emphasis placed by Allen upon the descriptive realism of oligopoly in modern western economies, the slim 17 pages devoted to it are surprising. And here, far more than elsewhere, I have misgivings about the analysis. Oligopoly is defined vaguely as 50-90 per cent of "output" of a "commodity" with at least minimal product differentiation produced by a "half-dozen" firms. Yet virtually every "case" discussed (other than game theory, which is brushed off in a parenthetical phrase) relates to undifferentiated products: Cournôt (at length), Bertrand, price-matching (where "the" equilibrium is the monopoly situation with no hint of entry), and kinked demand (with no explanation of the height of the kink, no reference to Stigler's criticisms, and no curiosity about the frequency with which upward as well as downward price matching occurs in industrial pricing). His price leadership case may not involve pure oligopoly, but one wonders if it is oligopoly at all because rival firms have steep demand curves that stay put as rivals' prices change. No mention is made of the tendency of leading firms to lose their market positions—indeed entry is only introduced in the postprandium where one finds that "in oligopolistic markets with free entry everyone loses." And a pet peeve concerning the "irrationality" of six radio station operators is given space in spite of its implications for the general analysis of the book, and the high probability (on the basis of the "data" given), that they were rational after all.

The time has surely come for textbooks to use illustrative materials drawn from studies where hypotheses based on microtheory have been put to some test and properly reported in the professional literature. But most of the analysis is very good. I particularly liked the integration of cost and product curves (p. 305) and was sorry that the clever device was not used again in Chapter 15 where the demand for inputs and the supply of outputs are treated together.

Bilas' text uses conventional chapter titles and concludes with a demanding

survey of approaches to general equilibrium analysis. Although he mentions fewer corollaries, he often pushes the basic relationships further while introducing more topics. This is evident in his excellent treatment of production functions of different degrees of homogeneity, of income effects and consumer surplus, and of general equilibrium. Good use is made of two colors in his diagrams.

Bilas has a few enthusiasms and follows a few conventions that may irritate some users. He takes pains to eliminate the sign for elasticity and for the marginal rate of substitution only to have to make exceptions, once, on the following page. He is fascinated by Giffen goods, returning to them again and again. Still, the pedagogical points are salutary. In Chapter 2 much is made of the distinction between Marshallian and Walrasian stability, a distinction appropriately omitted at the intermediate level. Yet no mention is made of Friedman's helpful distinction between backward-bending and forward-falling supply curves although his *Price Theory* is referred to elsewhere. Bilas introduces Stackelberg profit indifference curves to analyze interdependence. Unfortunately the figures are unnecessarily cluttered and confusing and are not explained well. Serious error arises when a diagram appropriate to price interdependence of differentiated products is used to analyze quantity interdependence (p. 222-23). This leads to the weird showing that collusion requires a substantial increase of output. Users of the book can construct the appropriate figure by adding to the Cournot case (Figure 10-2) a set of indifference curves for each firm, each profit peak occurring at its monopoly position. Bilas fails to point out that price leadership involves quantity followership.

The treatment of monopoly and oligopoly, although as conventional as Allen's, and more extensive, is nearly as distressing. Do firms find it practicable to engage in quick moves and countermoves in price policy? Has not the "dominant firm case" been shown to be necessarily short run with the advantage more likely to accrue to the smaller firms (*JPE*, Aug. 1957)? What evidence is there that oligopoly has reduced the share going to "labor"? Why is there no reference to studies attempting to measure the welfare loss to monopoly? Why is the empirical basis for the Sweezy kink not examined? And, if it is to be brought up at all, why is the reverse of the Sweezy kink not shown to be inconsistent with rigid prices? Why is it assumed that monopsonists have profits, so that wages can always be raised without loss of jobs? Why is it assumed that low-wage jobs are typically monopsonized, so that minimum wages will increase employment? And if this can't be shown, why does not the recommendation read in terms of "if"?

Still, any student who masters either of these books will have a good basis for graduate work in theory. The student who masters Bilas' book will be ahead of the one who masters Allen's, but fewer will master Bilas. The instructor who likes Henderson and Quandt will think both of these too elementary; I would not. But it would be better to emphasize oligopoly less until its theories have stood proper tests for relevance.

<div align="right">DEAN A. WORCESTER, JR.</div>

*University of the Philippines*

*Elementary Price Theory.* By BENJAMIN WARD. New York: The Free Press; London: Collier-Macmillan, 1967. Pp. viii, 184. $1.95.

Although comprehensive textbooks still have an important part to play in undergraduate education, perhaps increasingly so with greater specialization at the research level, the expansion of the limits of economics and of the market has created room for more narrowly gauged products. Supermarkets first drive out corner grocery stores and later incorporate delicatessen departments. The economics of paperback book production may also have encouraged the recent trend towards monographs designed for undergraduate audiences, which deal with one branch of the subject in greater detail than would be possible in the jumbo-size textbooks. Another welcome feature of this trend, more noticeable to a British reviewer of work written primarily for the American market, is that the paperback monograph is better suited to British conditions and more likely to be within reach of the pockets of British students. Professor Ward has added a primer on price theory for "serious beginning students" to the growing stock of such monographs.

Since the assessment of teaching material is more obviously subjective than most reviewing, it may help, and will certainly be more honest, to spell out briefly those developments in the subject, which, according to this reviewer at least, ought to be reflected in any serious modern text on price theory. While, perversely, price theory no longer constitutes the whole of economic theory, it is more inclusive than it used to be. It now covers rational decision making under conditions of risk and uncertainty in both market and nonmarket situations by households, businesses, and government. In the course of being broadened it has also become less (manifestly?) metaphysical. Increased sophistication on the analytical level has been accompanied, more often than in the past, by efforts to confront hypotheses with evidence, and to apply decision rules and criteria to practical situations. From the teaching point of view this presents an opportunity to make microeconomics as fruitful and relevant to an understanding of contemporary policy issues as macroeconomics has always appeared to be. But to make the most of the opportunity requires more methodological self-consciousness, based on recent debates on the strengths and limitations of maximization models, than was usual in textbooks written a few years ago. (By the way, this is one of the strong points in Lipsey, and is now a feature of the latest edition of Samuelson.) In addition to stressing the hypothetical character of microanalysis, it is necessary to show how conventionally derived (and organized) empirical evidence can be related to *ex ante* categories.

By these hurriedly sketched standards, Ward's modest book performs well on the whole. Apart from the more traditional topics, he includes discussion of risk and information, input-output production models, bargaining, and government decision-making. These features alone make the book an attractive proposition to those who find the standard material, by itself, a stodgy diet.

For the most part Ward is careful to spell out methodological pitfalls. This is not a luxury in an introductory work: good students must be aware of them; others, who may go no further, should not be left with false confidence

in the little they have grasped. Ward warns, for example, against confusing models with reality at the appropriate points, and reminds the reader that marginal-adjustment rules only tell you what the optimum is like once you get there. There is also a particularly useful treatment of the possible relationships between income, knowledge, and satisfaction. But there are a few lapses, chiefly in the chapter on "The Enterprise," where there is some looseness in the discussion of the maximization hypothesis. To defend profits as a feasible objective is clearly not a defense of *maximum* profits as a postulated goal. And given this goal the following statement is not as illuminating as it might seem: "Through the study of price theory we can get some idea as to why profits are so useful and important." Moreover, at one point the "likelihood" of U-shaped cost curves seems to be confused with their "convenience" as expository devices.

A more significant weakness of the book by the above-mentioned criteria is that it does not face the student with the need to relate theoretical categories to quantitative evidence for the purposes of testing or policy guidance. This is not easy in a short work, but some indication of the difficulties posed by *ex post* data could be given, even if this was mainly in the form of showing the divergence between the sort of evidence our theory requires for testing, and the sort of evidence we actually have. By the same token, the classification of situations which might justify government intervention of some kind, though clear, would have been considerably strengthened by a concrete example of the application of cost-benefit estimates to government decision-making. Some of the discussion of the virtues claimed or denied to that fiction known as the "market economy" could have given way to this type of exercise.

Nevertheless, Ward has covered a good deal of ground in an undogmatic, thought-provoking manner. The book should be helpful to all "serious beginning students."

<div align="right">DONALD WINCH</div>

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*Elementary Price Theory.* By PETER C. DOOLEY. New York: Appleton-Century-Crofts, 1967. Pp. vii, 173. Paper, $1.95.

The profession is continuously bombarded with books which are intended to simplify the subject matter covered in the elementary course. Most of these efforts fail because the authors mistake a cursory exposition of the topic for clarity. Unfortunately, Dooley's book does not represent one of the better efforts to make complex price theory more easily understood by the beginning student.

In Chapter 1 the student is introduced to the concept of equilibrium within the framework of a competitive market. The laws of supply and demand are stated without reference to the time dimension and the *ceteris paribus* assumptions. The author proceeds to point out the difference between shifts in the curves and movement along the curves even though the student has not been given any information as to what causes the curves to shift.

In Chapter 2, entitled "Consumer Demand," the explanation of marginal utility analysis is too brief. This part of the chapter could be improved by the

use of graphs and/or numerical examples. In the same chapter, following a discussion of arc elasticity of demand, the author points out that "Arc elasticity is distinguished from point elasticity, the elasticity at a point . . . on a demand curve" (p. 31). This is all that is said about point elasticity. If such a concept is not to be explained, it would be better not to mention it at all. Toward the end of the chapter the relationship between marginal revenue and demand is illustrated. However, the reader is not informed that attention has shifted from individual consumer demand to the demand faced by the imperfectly competitive firm.

The author deals with production theory and cost analysis in Chapter 3. His illustration of the production possibilities curve on page 52 is very misleading. He has fitted a curve to data on national defense expenditures as a percentage of GNP (guns) and personal consumption expenditures as a percentage of GNP (butter) for the period 1944-1947 and calls this a production possibilities boundary. Dooley claims that "It is possible to plot the production possibilities curve . . . because the time period was short—technology and resources could be treated as constants" (p. 53). What he fails to mention is that the unemployment rate could not be treated as constant during this time span. The unemployment rate varied from 1.2 per cent in 1944 to a high of 3.9 per cent in 1946.

Pure competition and pure monopoly are the subjects Dooley deals with in Chapters 4 and 5. These chapters would have been much better if the author had not tried to cover so many topics in so few pages. Consequently, the student does not receive a good introduction to the mechanics of short- and long-run equilibirum analysis or the political economy of competition and monopoly.

The student will get very little out of the chapter on oligopoly. Once again, Dooley covers too many topics too briefly. For example, the reader is introduced to the theory of cartels by being told that they act as monopolists and try to maximize joint profits. Without explaining what price and quota policy the cartel would have to follow in order to maximize joint profits, the author states that joint profit maximization would not be easy "especially where some degree of independence still remains" (p. 118). If the student is not made aware of the techniques of joint profit maximization, it is unlikely that he will understand the problems associated with attempting to maximize joint profits. The reader will find the author's discussion of administered prices equally unintelligible.

There are several places in the section on factor markets where the brevity of the exposition could cause the student to gain an incorrect impression of the subject matter being explained. For example, at the end of Chapter 9 Dooley states that "If the government restricts the production of cotton, the income of cotton farmers will rise" (p. 149). He fails to mention that one has to make an assumption about the elasticity of demand for cotton in order to reach such a conclusion. In Chapter 10 he concludes a discussion of monopsonistic exploitation of labor by pointing out that such exploitation could be offset by union action on the other side of the market. However, the author does not explain that such a minimum pricing technique alters the shape of the resource supply

and marginal outlay curves. Such an explanation is necessary if the student is to understand the impact of various levels of minimum prices on the quantity of this resource which will be supplied and demanded.

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### Income Theory; Related Empirical Studies

*Collected Economic Papers*, Vol. 3. By JOAN ROBINSON. Oxford: Basil Black-well, 1965. Pp. vii, 215. 30s.

This is a collection of Professor Joan Robinson's papers consisting mostly of book reviews and essays written in the five years from 1960 to 1964. Parts I and II contain a number of articles in which she tries to expose the analytical structure of her theory of capital accumulation, interwoven with incisive comments on basic premises upon which contemporary economic theory is built. One essay vividly, though briefly, describes the intellectual excitement of the inner working group surrounding Keynes before the publication of the *General Theory*, touching upon the influence Kalecki had upon them through the articles he wrote in Poland. A number of essays discuss political and economic problems of the post-Keynesian capitalism, ending with "The Final End of *Laissez-Faire.*" Part III consists of four articles on Marxism where she emphasizes, as in some of her previous writings, the acceptance of genuine peaceful coexistence in the world upon which the hope of reasonable discussion of the problems relating to Marxism depends. Finally, in Part IV are three essays summarizing her impressions from recent trips to India (1955), China (1963), and Korea (1964). They are memorable testimony to the nature of the struggle and efforts they are now making to escape from past misery in that part of the world.

All these, written with typical Robinsonian witticism and sharp comment, make amusing and instructive readings for students in economics. However, instead of going into a more detailed discussion of the problems raised by her in each of the papers collected here, I should like to concentrate upon those papers of a more technical nature contained in Parts I and II. I am particularly interested in them because they are directly or indirectly related to the theory of capital which has occupied her for the past decade or so, and a careful reading of them sheds light upon the conceptual framework of her theory, thus making the understanding of her *Accumulation of Capital* much easier.

Part I starts with an essay on "Teaching Economics" (*Economic Weekly*, Bombay 1960) presenting a scheme to reform the teaching of economics by proceeding with a comparative discussion of various economic systems in a broader historical perspective, and basing the theory upon a macroeconomic approach to production, accumulation, and distribution. The aim here is to establish a truly dynamic theory of a modern capitalistic economy, of which Keynes's *General Theory* is the short-run section. This is precisely what most post-Keynesian growth theorists have been struggling to achieve, without, however, much visible success.

The second paper is a review of Sraffa's *Production of Commodities by Means of Commodities*. She presents a well-organized, concise, exposition of Sraffa's theory, fully exploring various economic implications of his approach. Since Sraffa's book seems tersely written, without detailed proofs for all of the basic propositions, Robinson's lucid account of it is a useful introduction, although she singularly fails, as did Sraffa, to recognize the development of Leontief's input-output analysis and of von Neumann's model in the 'thirties, which has made the appearance of Sraffa's book in 1960 somewhat anticlimactic.

"Equilibrium Growth Models" had been written as a review article of J. E. Meade's *A Neo-Classical Theory of Economic Growth*. Since Meade's book is about the best, most clearly written, exposition of the neoclassical growth theory, the differences between her approach and that of the neoclassicals appear in sharp focus in her review. In this and in a number of other essays, she poses the question concerning the concept of capital underlying the neoclassical production function: how it is to be defined and how it is to be measured. This is one of the more fundamental problems facing anyone who tries to think in terms of the neoclassical theory, but the import of her question is often blurred by her insistence upon relating it to the validity of the marginal productivity theory and upon a particular interpretation she gives to the concept of the marginal product of labor (as illustrated by some of the passages in the book; see, e.g., p. 18).

A short essay on R. F. Findlay's paper on the Robinsonian model of accumulation once again brings out the crucial aspect of her capital theory. The urge to accumulate (animal spirits) is the basic determinant, together with the thriftiness condition, of the level of investment and the rate of profit, without, however, clarifying the exact context in which such a concept is being used. An appropriate formalization of the concept of animal spirits, say along the lines of Edith Penrose's theory of the growth of the firm or of Robin Marris's theory of managerial capitalism, would make her theory not only one of the most effective tools in analyzing the process of capital accumulation, but also it would serve as a bridge between her theory and the more traditional neoclassical growth theories.

The crucial importance she places upon the role of entrepreneurs in investment decisions may be also understood by reading "Pre-Keynesian Theory after Keynes." It is partly due to the way in which she views the nature of economic units comprising a modern capitalistic society, where workers, rentiers, and capitalists play major and conflicting roles in the determination of levels of output, employment, prices, investment, etc., in contrast with most of the neoclassical growth theories which more or less regard these classes as working harmoniously together. This is partly manifest in her emphasis upon institutional arrangements whereby various economic activities are organized, her criticism of the concept of butter capital and her insistence upon differentiating the schedule of the marginal efficiency of investment from that of marginal product of capital. The latter inevitably leads us to the second aspect of her theory which emphasizes the role played by the time element in the process of capital accumulation or in economic activities in general. Thus the con-

cept of perfect foresight is pushed aside as being illogical, and today is an ever moving break in time between an irrevocable past and uncertain future (p. 68). The recent development of growth theory has been largely based upon the Walrasian theory of general equilibrium, and as some of the current contributions to, say, the problem of international capital movements indicate, there seems to be a fair amount of confusion in the literature between static and dynamic concepts, thus making it worthwhile to pay more attention to this problem.

The third aspect of Robinson's theory, discussed in such essays as "Consumer's Sovereignty in a Planned Economy" and "Latter-Day Capitalism," is concerned with the adverse effects that the mechanism of *laissez-faire* capitalism has brought upon the welfare of the society, because the services to meet basic human needs, such as housing, health services, and education, which do not readily lend themselves to mass production, are not an easy field for making profits.

In light of these points, the conceptual basis of her capital theory is more readily comprehensible and appears as an attractive alternative to the more standard theory, even though the differences between them are not as significant as she seems to imply, and the theoretical framework in which these aspects are fully taken into account is not yet in sight.

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# History of Economic Thought

*Types of Economic Theory, From Mercantilism to Institutionalism.* Vol. 1. By WESLEY C. MITCHELL. Edited with an introduction by Joseph Dorfman. New York: Augustus M. Kelley, 1967. Pp. xi, 608. $12.50.

This volume is part of a greatly enlarged edition of the famous lecture course on "Types of Economic Theory" given by Wesley Mitchell at Columbia University for over thirty years. An earlier mimeographed version—based on (hitherto privately circulated) students' notes and never formally recognized by Mitchell—was published in 1949, and was soon highly regarded by historians of economics. Now Mitchell's former pupil and colleague, Joseph Dorfman, the leading expert on American economic ideas, has combined a variety of materials—including various versions of Mitchell's lecture notes, transcripts, abstracts, outlines made throughout his professional life, excerpts from his published writings, and lecture notes compiled by the editor and others—to produce a fittingly erudite monument to Mitchell's scholarship.

These lectures inevitably invite comparison with Schumpeter's massive posthumous *History of Economics Analysis*. Both men were outstanding economists whose writings bore indelible traces of their personalities, and both transcended the usual limitations of works in the field. Yet, their preconceptions were fundamentally different, for while Schumpeter regarded the progress of theory as his primary theme, Mitchell dismissed *dogmengeschichte* as an approach that "satisfies no one who is himself awake" (p. 535), one that interests

only those who believe the theory to have "permanent validity" (p. 25). He considered that students "will never have any adequate appreciation of what role the social sciences can play in life unless they look at the thing as something broader, something more active, than a discussion of a set of varied, abstract problems conducted on the basis of analysis of imaginary conditions" (p. 373). The history of economics was, to him, "part of humanity's struggle to deal with the problems that evolving social life has brought" (p. 25). Hence, the purpose of his course was instrumentalist and present-minded, since he wished "to help students to become better constructive workers by understanding more clearly the relation between cumulative economic changes and economic theory" (p. 10).

History is called upon to perform many tasks, of which this is but one—and perhaps not the most vital; but, given his intention, Mitchell executed it with clarity, consistency, insight, and erudition. He emphasized the social aspects of the development of ideas, especially the interaction of intellect and environment, for "social conditions may not affect the birth rate of genius, but they do affect the problems which interest genius, and they determine what type of genius shall get a hearing" (p. 171). As with Schumpeter's *History*, this volume contains many shrewd comments on the sociology of economics, a topic that has been unduly neglected by historians of the discipline. For example, Mitchell described the emergence of political economy as an independent specialism; its methodological peculiarities as a science; its development as "a way of thinking about things rather than an organized body of steadily growing ascertained knowledge . . . [that is, by] excogitation rather than investigation" (pp. 146-47); the rise and fall of schools of thought; the growth of academic posts and professional self-consciousness; the role of intellectual authority; the changing public reputation of the discipline; and the vital part played by practical rather than purely intellectual interests. Naturally the treatment of these matters reflects Mitchell's personal predilections as, for example, in his preference for Malthus' empirical method rather than Ricardo's deductive method, and in the great importance he attached to the psychological foundations of classical political economy. His view of Bentham and utilitarianism is well known, and his institutionalist leanings appear in his periodic references to the role of money in society, cumulative change, and the pecuniary culture. Indeed, the very title betrays his conviction that "economics is in a rather rudimentary stage as a science. It exists not as a single body of theory; but as several types of theory. A critical appreciation of these different types . . . is of use to a person who wishes to know what economics can accomplish and particularly to a person who wishes to remain or become critical of his own ideas" (p. 13).

Given its size, the chronological and geographical range of Volume I is comparatively limited, for despite the word "mercantilism" in the subtitle ("institutionalism" will appear in Volume II) it is mainly devoted to Britain between 1750 and 1850. A revealing introduction "On the Study of the Economic Classics" leads to chapters on "Adam Smith and How Political Economy Came to be Systematized in England"; "Jeremy Bentham and the Utilitarian Creed"; "Thomas Robert Malthus and the Empirical Trend"; "David Ricardo and the

Making of Classical Political Economy"; "The New Social Sciences at Work: The Philosophical Radicals"; "Political Economy in the Days of Its Triumph"; and "John Stuart Mill and the Humanization of Classical Economics."

Two main factors determine the scale of the project: the range of issues Mitchell considered relevant to "the social history of classical political economy" (p. 484) and sheer repetition—which is largely a matter of editorial policy. Mitchell's interests were catholic, for he concerned himself with the "type of problems the man attacks, his way of formulating them, what materials he had to work with, the general method he employed, the things he took for granted without inquiry, the grounds for the confidence he felt in his results, what use he put these results, to their acceptance or rejection by his contemporaries and the reaction of his scientific work upon social processes" (pp. 6-7). As he recognized, this approach made the history of economics appear "far more complex than it seemed to our predecessors" (p. 5) and presented difficult organizational problems and decisions about the proper boundaries of any given discussion. As the reviewer is fundamentally sympathetic to Mitchell's intention, believing that more historians of economics should place their work within such a broad framework, it is the more painful to report that he often went into far more detail than his argument required. Admittedly his treatment of the historical setting of classical political economy and the interactions of ideas and policy have stood the test of time remarkably well, despite the wealth of subsequent research and post-Keynesian reinterpretation. Nevertheless, too much space is devoted to the growth of democracy and the minutiae of contemporary politics, and there are too many biographical sketches of minor personalities who, however colorful and interesting in themselves, tend to distract attention from the main story. Moreover, the editor's zeal and scholarship have emphasized these features, for he has added much (valuable and well-chosen) supplementary information and has reproduced Mitchell's comments and summaries, some of which, however appropriate to his audiences, seem superfluous in a work of this size.

So skillfully has the editor connected the various tissues that one is sometimes, perhaps unjustifiably, in doubt as to where Mitchell ends and Dorfman begins; and the scale of the project is so vast that it seems likely that its readership will be unduly restricted. It might, therefore, eventually be worth considering the publication of an abridgement containing the quintessence of Mitchell's message.

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A. W. COATS

*The Great Economists: A History of Economic Thought.* By HOWARD D. MARSHALL. New York: Pitman Publishing Co., 1967. Pp. 397. $7.50.

*Development of Economic Analysis.* By I. H. RIMA. Homewood, Ill.: Richard D. Irwin, 1967. Pp. xvi, 422. $7.75.

These two books are designed to meet the need for courses in the history of economic thought at the undergraduate level. The approachs of their authors are quite different. Professor Marshall's approach is the one traditionally used

in the writing of histories of economic thought. He follows the usual path of surveying the work of the outstanding figures and schools of economists who were active in the development of economic thought from the Greeks to Keynes. Since this is done in the space of only 369 pages it is quite clear that Marshall's book can hardly be more than an outline of the history of economic thought. Since no generally recognized contributor to the development of economic thought is left out of Marshall's survey, many outstanding contributors are fortunate if their work is treated in more than three or four pages, while lesser-known figures such as David Hume are dismissed with less than one page. Marshall's book is much too condensed to provide what this reviewer would regard as an adequate coverage of the subject even for a class of undergraduates.

Marshall's survey of the history of economic thought is of quite uneven quality. His material on the economics of the very outstanding contributors to the development of economic thought such as Smith, Ricardo, Marx, and Keynes has had the benefit of the work of earlier specialists in the field of the history of economic thought. However, when Marshall turns to less-well cultivated areas of his subject the treatment is much less satisfactory. For example, we learn that Veblen criticized the classical school of economists (p. 288) when the fact is that he criticized the neoclassical school. We are also informed that one of Veblen's four instincts was the "instinct for pugnacity." What Veblen referred to is usually called by him the "acquisitive instinct," which of course has nothing to do with being pugnacious. Marshall states that Veblen left his readers with no way to measure progress. It was Veblen's main point that progress was achieved by substituting economic values for pecuniary values, and that economic values with their high social utility would contribute to race survival. Marshall makes no reference to Veblen's concepts of economic and pecuniary values in his analysis of Veblen's contribution to the development of economic thought. When discussing Wesley C. Mitchell's contribution Marshall asserts that Mitchell's two best remembered books are *Business Cycles:The Problem and Its Setting* (1927) and *Measuring Business Cycles* (1946). This reviewer is under the impression that Mitchell is best remembered not for these two books but rather for his well-known pioneering study, *Business Cycles*, published in 1913, to which the author makes no reference and the contents of which do not appear to have influenced his discussion of Mitchell's contribution. It is also difficult to understand how one can summarize John R. Commons' contributions without mentioning his basic concept of "the going concern" and his theory of "reasonable capitalism."

In discussing the economics of John M. Clark (who was born in Amherst, Massachusetts, and not in New York as stated on p. 354) Marshall states that Clark's solution for our major economic problems is action by voluntary groups who would enter a kind of "voluntary social contract" (p. 358). In his writings Clark refers not to any voluntary social contract but to a form of social-liberal economic planning as the way out of our economic difficulties. (See his *Guideposts in Time of Change*, 1949, pp. 198-99, and his *Social Control of Business*, 1939, p. 46g.)

The last major chapter of Marshall's book is concerned with the economics

of capitalism. This chapter is devoted to the economics of Keynes, J. M. Clark, and Schumpeter for the reason that "they were giants in the history of economic thought" and "were concerned about the future of capitalism" (p. 324). Neither reason seems to justify putting together such widely different types of economists as Keynes, an institutionalist, and an anti-Keynesian. Marshall's volume concludes without paying any attention to the current generation of economists. Rather than conclude his study with observations on current trends in economic thought, Marshall declares that it is easier to discuss dead than living economists. This may be true, but surely not very satisfying to intellectually curious undergraduates.

Professor Rima's approach to the development of economic thought is to concentrate on the development of the analytical tools and concepts which comprise what is known as pure or analytical economics. Since Rima limits himself primarily to the writers and schools of economists "whose works have a predominantly theoretical content," he has restricted the scope of his study to what can be adequately handled in 465 pages. He reviews the development of economic theory from the theorizing of the mercantilists on foreign trade and money to the Harrod-Hicks-Duesenberry growth models. Following this course, the undergraduate is introduced to the essentials of micro- and macroeconomics in an historical setting. The coverage is excellent and the exposition is very good.

The approach of Rima's book is chronological. There is some overlapping with more traditional treatments of the history of economic thought, since the author pays some attention to the events and problems of the periods and countries in which analytical tools and concepts were developed. The main emphasis, however, is on the way analytical tools and concepts were developed when individuals attempted to explain economic phenomena. Since Rima's concern is with pure or analytical economics his chapters deal primarily with the work of the Classical, Neoclassical, and Keynesian schools. The only exception is Karl Marx who built on Ricardo, and who constructed a model of the capitalist system which is suggestive of some of the recent Keynesian growth models.

Rima calls attention to the fact that the limitations of analytical economics are particularly evident with respect to the theory of economic growth. Growth models are useful as long as they are constructed in terms of changes in the stock of capital and the employment of labor which are made in response to changing profit expectations. When an attempt is made to introduce institutional changes or innovations, conventional growth models are found to be inadequate for dealing with the growth problem. Likewise, as Rima points out, econometrics is not prepared to handle data which cannot be given quantitative expression.

Rima appears to be on firmer ground when he is dealing with the nature of analytical tools and concepts than when he moves over into the area of economics and its philosophical and historical setting. It is not clear from his analysis whether he regards analytical economics as a kind of universal economics whose validity has no dependence on time or place, or whether analytical eco-

nomics is somehow relative to time and place. At one point (p. 13) the reader is told that analytical economics consists of "essential truths which possess a validity independent of the philosophical and political beliefs of their authors and which have become incorporated in the body of principles accepted by succeeding generations." Later (p. 404) the reader is informed that the economist seeks truths that "are never absolute but stand always in relation to people's attitudes and beliefs and to the course of events."

No matter how we view the nature of analytical economics, we can surely agree with Rima that we can learn a great deal about economic analysis from a study of its historical development. For those instructors who wish to give their students in intermediate economic theory an historical orientation for the concepts and tools that they are analyzing, Rima's book will be found very useful.

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## Economic History; Economic Development; National Economies

*Economic Development of the North Atlantic Community, Historical Introduction to Modern Economics.* By DUDLEY DILLARD. Englewood Cliffs, N.J.: Prentice-Hall, 1967. Pp. viii, 747. $10.95.

This is a monumental work. Dillard has assembled in 750 pages an account of the economic history of both sides of the Atlantic from the manor to the Great Society. It is all here—the broad developments in agriculture, commerce, banking, industry and institutions, and the details of the medieval wool trade, the price inflation of the 16th century, the distribution of wealth between gentry and aristocracy in the 17th century, the level of living from 1780 to 1830, Germany's overtaking of British industry, the Marshall Plan, the Common Market, and the war on poverty. Thirty-eight chapters are divided among four books on: (1) the medieval roots of the Atlantic economy; (2) its mercantilistic founding; (3) industrialization; and (4) integration (post World War II). The writing is clear and well paced. The information packed in these pages is enormous. The total impression the book makes is overwhelming.

Second thoughts inevitably raise questions. What is it for? The subtitle suggests that Professor Dillard hopes that his labor of love and of perhaps a decade will be used as an introductory textbook in economics. A considerable amount of the history of thought is interwoven with the chronological account, and some analytical ideas—but by no means all—are introduced with explanations appropriate to an elementary text. But this reviewer regards it rather as "An Introduction to Economic History" which should come after a student has had a course or courses in principles. The initial 100 pages on the medieval precursors of capitalism will not appeal to many instructors as the best way to engage the interest of the neophyte. (If an historical approach to elementary economics were to be adopted, should it not run backwards from the Great Society to the manor?) And too many analytical points are asserted rather than explained—the contribution of double-entry bookkeeping, inflation as a source

of capital accumulation, the price creep of retail prices, and capital/output ratios, for examples—so that the instructor would have his hands more than full. It will then appeal more to the teacher unwilling to choose between the United States and Europe for the first course in economic history.

When so much is packed between Dillard's covers, it is ungrateful to discourse on what is missing. But it is well to be clear on two points. In the first place, much is made of the focus on the North Atlantic community. But the book deals relatively little with the North Atlantic as a whole, and more with the United States and Western Europe, largely Britain, France, and Germany, separately. There is very little on Italy, the Low Countries, Scandinavia or Central Europe, and nothing on Canada, not even mention of Harold Innis and his "staple theory." The interconnections between Britain and America are developed for the mercantilist colonial period and then allowed to languish through the 19th century, with nothing on the related long cycles discerned by Brinley Thomas and Jeffry Williamson, or the push and pull of migration studied by Jerome. The shift of the source of migration from northern Europe in the first half of the century to the south and east in the thirty years before 1913 is hardly mentioned, nor the redirection of emigration from trans-Atlantic to intra-European after 1950. The interconnections do emerge in the narrative in the 1920s (war debts and reparations) and the 1930s (spreading deflation), and of course in the post-World War II recovery. In the main, however, the subject is Europe and the United States.

Secondly, Dillard claims to use Keynesian macroeconomic theory more than any other. As a well-known expositor of Keynes he can be expected to use his comparative advantage and to draw on his intellectual capital. This reviewer, however, finds that the claim is not fully justified. Dillard finds it difficult to defend mercantilism on the grounds of employment, though he piously seeks to do so (p. 173). (His main and somewhat surprising defense of mercantilism is that it provided the countries of Europe, and the United States with its mercantilist Constitution of 1789, with the internal prerequisites for industrialization: toll-free roads, coinage, literacy, education, including a skilled labor force, and basic facilities such as social overhead capital. But is this the essence of mercantilism rather than the external aspects of bullionism, a favorable trade balance, and protection, which he also discusses?) Keynes is again quoted on the 1920s in support of single ideas, rather than the application of his macroeconomic system. In the 1930s, when the Keynesian system comes into its own, it is vital in describing the depth of the depression to go beyond the multiplier-accelerator analysis to the spreading collapse of the international and U.S. national banking systems. This is done in the account of events, but occasional *obiter dicta* (e.g., pp. 576, 583) attach too much importance to real rather than monetary factors. A final appeal to the authority of Keynes is a quotation on the need to maintain effective demand as the answer to the paradox of poverty in the midst of plenty (p. 718). This is a necessary but not a sufficient answer, as Dillard himself suggests in his emphasis on human resources (pp. 314, 360, 395) and his interwar attention to transformation (pp. 523ff.). There is no need to take the view that Keynes had the complete answer to all questions.

If any economic theory actually dominates Dillard's story, it is a Berle and Means, or today a Galbraith one, which attaches central importance to the decline of competition and the rise of large-scale oligopoly. Both in Europe (e.g., p. 534) and in the United States (e.g., p. 575), the move is away from the free market and toward what Dillard, like Shonfield, feels is inevitable, "indicative planning." There is the highest praise for the Common Market: "the most important institutional change in Western Europe in the twentieth century" (p. 639) and the "most spectacular economic achievement of western Europe" (p. 711), but no consideration of the (say) Scitovsky view that the Common Market's success has been in widening competition and breaking down monopoly. "The most striking long-term feature that emerged from the war and postwar experience has been the movement toward general economic planning" (p. 642). In the United States, government has thus far only taken responsibility for the maintenance of full employment (p. 672), but the hint is dropped that business agreement to this government responsibility may ultimately lead to acceptance of planning (p. 715). That such planning is everywhere an unqualified success is implied but not demonstrated.

It is of course easy to single out interpretations of economic history by Dillard which differ from one's own. The test of a successful performance is not that a reviewer can find points on which to differ, but that he is content to accept the writer's interpretation on subjects which he does not know well. Dillard passes this test brilliantly. By the same token I find the chapter on French industrialization pedestrian, his account of the 1931 financial collapse overwritten (cf. pp. 542 ff. "wave after wave," "fast and furious," "nightmarish," "frenzied," "house of cards," "snow in a blast furnace," etc., where rhetoric substitutes for description and analysis) and his reliance on Svennilson extreme (cf. p. 535 where the word "transformation" occurs five times in six sentences, and seven times in thirteen).

The professional economic historians may take Dillard to task for his almost exclusive reliance on English language (and translated) sources and for slighting Marx. There are only five references to works in German and French in the otherwise excellent chapter bibliographies, generally running to more than a page. In the index—also excellent and covering 28 double-columned pages—Keynes has 22 citations, Adam Smith 20, Tawney 13, and Marx but 4, or broadly the same number as modern but not yet immortal writers such as Gerschenkron, Landes, and Temin.

But one cannot ask Dillard for everything. His is a tremendous accomplishment to have organized and synthesized this mountain of fact and interpretation. Graduate students reviewing for general examinations will be deeply in his debt. Ditto the general economist seeking references to those parts of economic history he does not know well. Some economists and many economic historians will adopt the book as an introduction to economics in general, or to economic history in particular. There is no doubt that Dillard's *Economic Development of the North Atlantic Community* will be with us for a long time.

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*American Railroads and the Transformation of the Antebellum Economy.*
By ALBERT FISHLOW. Cambridge: Harvard University Press, 1965. Pp.
x, 452. $10.00.

The wave of railroad construction in the 1850s "opened the West" from
the Ohio to the Missouri for the expansion of agriculture and the consump-
tion of the products of eastern industry; but did it have any great effect on
the growth of the economy as a whole? Did breaking new soil and laying
new roadbed come to no more than an exchange of new for old resources and
only at the margin, or was it an appreciable cost advantage in transport that
spread through and stimulated higher investment in all industries? The cur-
rent myth is that there was a breakthrough to higher growth occasioned by
the laying of the lines to the West, at least after a time and indirectly if not
directly. Professor Fishlow reduces the myth to reality by bringing the
highest order of professional economist's skills to bear on evidence as to the
direct benefits and the external economies from the 1840–60 railroads. But
he does not provide much new knowledge to take its place.

Direct benefits accrued from reductions in costs of the tonnage carried
from producer to consumer. The reductions might be termed $\Delta C/T = (C - C^*)/T$ from replacing costs $C/T$ per ton on the canal or team with rail-
road per-ton costs $C^*/T$; the total tonnage on which this reduction took
place was $(T+\Delta T)$ and included the amount $T$ carried by the canal under
original cost conditions and the amount $\Delta T$ generated by the new lower
costs. Direct benefits were large, then, if either the cost reduction was large
or the stimulus from the new transport technique for new production of
goods elsewhere was strong. Fishlow uses the change in rates $\Delta R$ multiplied
by tonnage $(T+\Delta T)$ under the new regime to show that the total amount
of benefits was small. The five major rail systems were alternatives to well-
established river and canal transport systems so that they promised to take
away the 1850–60 traffic at average rates only 1 to 2 cents per ton mile
lower than charges under the old ways of carrying freight. Other linking
lines carried tonnage which would have gone to turnpike freight companies
at rates 15 cents per ton mile higher in their absence. For the total traffic
of the western roads, the 1859 direct benefits from not having to go to these
higher rates for other means of travel came to $225 million, an amount ap-
proximately 4 per cent of that year's Gross National Product. This small
amount reduces the myth that vast resources were released by the roads
for other uses.

Fishlow is successful in providing perspective on orders of magnitude of
social savings, but does he have a good estimate of such savings? As he
recognizes, the rate difference on the rail tonnage $\Delta R(T+\Delta T)$ is equal to
$(\Delta C/T)(T+\Delta T)$, the aggregate resource savings, only if rates were equal to
marginal costs. They surely were not; the transport of agricultural products
before the railroads was dominated by the canals, and barge rate-marginal
cost differences must have reflected this dominance. The entry of railroads
into their markets must have reduced canal rates—"the large reduction in
the Erie Canal rates in the 1850's, for example, is clearly related to railroad
competition" (p. 268)—so that the rate-cost differences were reduced but

not necessarily made equal to zero for either the new or the old type of transport. At worst, the rate reductions resulted entirely from competition rather than from any cost reductions; then the benefits were not $\Delta R(T+\Delta T) = T\Delta R + \Delta T\Delta R$, since $T\Delta R$ was a transfer of income from canal shareholders to shippers rather than a change in resource costs, but simply $\Delta T\Delta R$, the new tonnage $\Delta T$ generated by the new rate $\Delta R$. Perhaps this new net product $\Delta T\Delta R$ should be counted as the only benefit—as more real output generated from the rate reduction. In the context of this study, $\Delta T$ could not have been more than the previous tonnage (surmised from Table 40) so that the product of the two increments would have equalled only one-half the $225 million shown as direct benefits. But this again is too much, because the increment of product was not $\Delta T\Delta R$ but $\int_{r_1}^{r_2} T(R)\partial R$ for the difference between old and new rates $r_2$ and $r_1$ for all demands for transportation; a better estimate of this, $\Delta T\Delta R/2$, implies direct benefits one-fourth those shown by the author. The point is that the estimate in this book is "small," but another based on more realistic assumptions on market competition is smaller still.

There were economy-wide effects beyond the surplus of those using the new railroads. The demands for capital goods and labor of the new railroads themselves had a multiplier effect on national consumption and investment, and perhaps an accelerator effect on investment as well; but "no precise analysis calculating what these expenditures meant to the realized rate of growth is feasible." That these demands centered on the coal, iron, and machinery industries was important because they stimulated technical progress and the establishment of a generally higher level of skill in a few industries with consumers throughout the economy. Furthermore, the railroads made these resource-based industries grow. But again, the importance of such assertions depended on the magnitude of railroad demands in these particular markets. In the case of iron products, conflicting data and their interpretation by Fishlow and R. A. Fogel leave the reader quite unsure as to the extent and thrust of demands for high quality rail. In the case of coal, "more of the output of the nation's coal mines found its way to the railroad sector than any other." There were many machine shops on the railroads themselves, specifically for maintenance and repair of equipment. Railroad purchases might have had some appreciable effect towards increasing the quality of outputs in these particular industries. That's that.

The case for railroads causing economy-wide growth has to rest on this form of transport reducing the costs of all other industries so that these other industries then greatly increased their investments and outputs. This case would be helped along the road to plausibility if these (irreversible) external economies appeared first—if the railroads were constructed and then were followed by the entry of large scale agriculture, commerce, and industry into their service regions. If this was the planned sequence of events, the roads must have expected profits to rise over time from an unacceptable level the first few years of operation to a more than competitive return after the establishment of new industry and trade. Fishlow provides some evidence to the contrary: the profits on the western railroads

declined over time from initial levels comparable to or better than those on the eastern roads to "less satisfactory levels." But this is after the fact, and the consequences of disruptions in financial affairs in 1857 and extensive new entry and overlapping of the railroads in the later years of that decade. If these events were correctly foreseen, then the data are evidence for railroad construction lagging demand, but if they were unexpected then "satisfactory" profits should have increased to a much higher level. Then the issue is whether or not returns termed "satisfactory" in this study were sufficient to cover the cost of capital at that time in an industry subject to the risks of new enterprise. There is little evidence of assistance in resolving this issue; the author thinks the initial returns were "high," and the reader is invited to think the same.

The costs of agricultural production were substantially decreased from the movement of this industry westward. Land preparation costs were reduced, and the land itself was more productive; the first may have saved as much as $65 million in the initial costs of clearing new acreage, and the second $14 million per year in the cost of labor to produce the same amount of output in the East as was realized in the West in 1859. These indirect benefits were then an appreciable percentage of direct benefits, and they could have been greater still, if the increased farm incomes consequent from the reduced costs brought forth a larger supply of labor and other resources. Fishlow finds that, assuming only a 5 per cent increase in factor supplies as a result of higher factor prices, the increased output from increased resources would be another $18 million for that one year alone. But these benefits may have also been considerably less than Fishlow found because, while utilizing less labor and capital, western agriculture utilized a great deal more transportation. The western roads diverted trade that would have gone South to the eastern seaboard, and increased the volume of this trade; if they are given credit for all of the transportation inputs and (contrary to the above) rates were equal to costs, then approximately $18 million of transportation resources were added while these other resources were subtracted (in keeping with Table 44). With tens of millions of dollars added and subtracted from small changes in assumptions, it is difficult to place much reliance on estimates of indirect benefits.

The impression is that the westward migration of the railroads did not change the total costs of resources involved in transportation by very much, nor did their external economies have a marked effect upon development of this region and the relative slowing of growth in other regions. In the absence of data of a quality making estimation possible, Fishlow's guesstimate is as good as any: "without the innovation growth would surely have been slower, but the country would not have withered; 5 per cent, or even 10 per cent, of 1859 is a small sum in this context." This is not very satisfying; with the full resources of Harvard University, its Press, and an exceedingly inventive economist at hand, shouldn't more economic knowledge result? Perhaps it will, when the author turns his talents to information meriting them.

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*Boston Capitalists and Western Railroads: A Study in the Nineteenth Century Investment Process.* By ARTHUR M. JOHNSON AND BARRY E. SUPPLE. Cambridge, Mass.: Harvard University Press, 1967. Pp. x, 392. $10.00.

This study of railroad finance and organization, number 23 in the Harvard Studies in Business History, ranks with Hidy's history of the House of Baring as the very best in that series. From the point of view of an economist interested in economic history, business historians tend to have two faults. Frequently they focus so narrowly on a particular business enterprise that they fail to suggest how the experiences of that firm are related to the more general questions of economic history. The more sophisticated sometimes avoid this trap, but even they seldom ask questions of their data that are particularly relevant to an economic historian studying the same period or to an economist interested in the problem of economic growth. Whatever minor flaws *Boston Capitalists* may have, Johnson and Supple cannot be faulted on either of these scores, and as a result, this volume will almost certainly be added to the reading lists of most graduate courses in 19th century American economic development.

Johnson and Supple are interested in the role of a group of Boston capitalists in the development of the midwestern railroad network in the years from the mid-1840s to the end of the 19th century. On the one hand (as their title suggests), they are concerned with the methods employed in mobilizing the capital for these railway enterprises and on the other (as the title does not suggest), with the contribution of the Boston-based group to the supply of managerial and entrepreneurial talent employed by the roads. Since the book is published under the imprimatur of the Harvard Business School and since both authors are or have been members of the faculty of that institution, it is hardly surprising that they have adopted a case approach to their subject. There are separate chapters on the early roads in Ohio and Michigan; on the Illinois Central; on the C. B. & Q.; on the Union Pacific; and on the Atchison, Topeka, and Santa Fe. However, the book is much more than a series of isolated case studies. The authors are interested in a set of general problems, and they approach each case study with a list of relevant questions. Moreover, Johnson and Supple have been willing to compare the experiences of their firms and from this comparison have drawn some important generalizations about the processes of capital mobilization and entrepreneurial development. This is not typical business history.

Overall, the authors' conclusions tend to reenforce what we already know of 19th century development, but some lecture notes will have to be rewritten in view of their findings. They begin their analysis with the decline in overseas investment opportunities that forced New England capital and enterprise to turn to other activities and they show that western railroads were an important recipient of these transfers. As to finance, they indicate that it was the informal financial relationships (that is, personal relationships based on close social contact and firm-to-firm financing) rather than the formal markets that were the mechanism for transferring capital from New England trade to western railroads. This finding is something of a surprise. While recent work had indicated that in most areas of economic activity, initial mobilization had taken

place outside the formal markets, it has been generally assumed that railroad finance was one of the few examples of mobilization in the "traditional" manner. As to entrepreneurship, the authors show that in many cases it was Boston talent that was responsible for the success of the western ventures. Thus, Johnson and Supple conclude that it was investment tied to management that was the contribution of the Boston community to the U.S. railway network.

The book, despite its very substantial contribution, is not without some weaknesses. First, at times the authors' preoccupation with business history has stopped them from pushing their analysis as far as an economist might like. For example, while making an excellent case for the role of the informal capital markets in the mobilization process, they have not examined the mechanism of these transfers in detail. No one is in a better position than the authors to answer questions about, for example, the cost of financing in this manner, or the exact nature of the nonmarket relationships employed, or simply questions about the formality of these infomal relationships. It is certainly too bad that they did not extend their work a little farther in these directions. Second, at times the authors employ an analytical framework that interferes with their analysis more than it helps. Although they deny attaching normative judgments to terms like "opportunistic" and "developmental" investor, these distinctions are to a large extent useful only in terms of normative judgments. From a positive point of view, it would have been far more revealing to examine the investors' decisions in terms of alternative rates of return and perhaps to have suggested something of the nature of their utility functions. Similarly, concentration of attention on a railroad during some stage of its development obscures the process of interstage movement, and certainly some of the most interesting questions relate to such movements. Finally, at times, the authors have failed to specify the nature of the models they use and this leads to certain ambiguity. For example, in their examination of the later stages of railroad development, Johnson and Supple argue that the nature of competition led the roads to build extensions and connecting routes that they knew were going to be unprofitable. This conclusion is subject to a number of interpretations; but without some clear specification, it is almost impossible to understand the thrust of the authors' argument.

Despite these objections, and they do reflect an economist's biases, the book is a notable contribution not only to business history, but also to the literature on American economic development. It should be read by every serious student of United States economic history.

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*The Revolution in Egypt's Economic System.* By PATRICK O'BRIEN. New York: Oxford University Press, 1966. Pp. xvi, 354. $8.80.

*Growth and Structural Change in the Egyptian Economy.* By DONALD C. MEAD. Homewood, Ill.: R. D. Irwin, 1967. Pp. xv, 411. $8.50.

*The U.A.R. in Development: A Study in Expansionary Finance.* By GEORGE K. KARDOUCHE. New York: F. A. Praeger, 1966. Pp. xiii, 170. $10.00.

These three books on Egypt have only that in common. There is virtually

no overlap between them, although the Mead book not only overlaps with the 1965 Hansen and Marzouk study[1] but is virtually a replica of it. I shall therefore review each book separately rather than conjointly.

O'Brien's scholarly and important work attempts to "trace, explain, and evaluate the changes in Egypt's economic organization" with particular reference to the changing role of government vis-à-vis the economy since the July 1952 military coup. He begins with the coup but points out that the military take-over was not a turning point inasmuch as the Junta did not bring with them any preconceived economic ideology. They, in the beginning, were content to cooperate with the capitalists and landlords and even as late as 1954 the Minister of National Guidance could announce, "Our economy can only prosper under free enterprise" (p. 68). As O'Brien repeatedly reiterates, the change in attitude towards the private sector came with the Suez crisis (1956) and a further hardening became evident in 1960 with the initiation of Five-Year-Planning. He thus relates the transition of the Egyptian economy from free enterprise to socialism in three stages: the Free-Enterprise Phase (1952-56), Guided Capitalism (1957-60), and the Demise of Private Enterprise (after 1961).

But O'Brien first presents a brief survey of Egypt's economic problems as they appeared at "mid-century" since the "institutional and legal changes promulgated since then represent a response to these problems" (p. xii). Also to ascertain to what extent these responses represent "real innovations" he presents in Chapter 2 an account of government and the economy before the revolution. Here, in addition to giving an excellent account of the totalitarian regime of Mohammad Ali (1805-49),[2] he notes that the State, even in the heyday of industrial laissez-faire (1850-1914), remained intimately involved in the country's economic development because it retained its overall responsibility for the Nile irrigation system. He also traces what he calls the "slow retreat from the free market system" (pp. 46-67), as political power was slowly shifted from the British to native Egyptians and the latter reacted, in terms of a series of social welfare measures, to two World Wars and the Great Depression.

These measures (although on far too small a scale to seriously come to grips with Egypt's problems of rural poverty) did lay, O'Brien notes, the foundation and established "the broad lines of future agrarian policy." And, as for the small industrial sector, even as early as 1935 a Five-Year Plan of public expenditures, mainly on what we would call today "infrastructure" received parliamentary approval, but "war and the preparations for war" laid this scheme to rest (p. 54), so that by the eve of the 1952 Revolution the "direct part played by government in the economic life of the country still appeared relatively insignificant" (p. 60).

Faced with a stagnating economy (i.e., per capita income was not increasing), in which the cultivated area per person was steadily declining and an in-

[1] *Development and Economic Policy in the UAR*, reviewed in this journal's December 1966 issue.

[2] Although the best short summary of Egyptian economic development since 1800 still is Issawi's article in *Jour. Econ. Hist.*, March 1961, recently reprinted in C. Issawi, ed., *The Economic History of the Middle East, 1800-1914*. Chicago 1966, pp. 359-74.

dustrialization process proceeding far too slowly to provide alternative employment opportunities outside agriculture, the Free Officers in July 1952 found themselves "confronted with a daunting array of economic and social problems" (p. 306). How they responded to these problems, given their initial lack of an economic ideology, their subsequent dissatisfaction and later distrust of the private sector, and their eventual acceptance of a totally and centrally directed economy, forms the core of O'Brien's fascinating study.

In effect O'Brien says that socialism came to Egypt mainly because the private sector would not shake off its landed-class bias favoring investment in land and residential buildings instead of industry, despite the government's renewed attempts to encourage such investment by raising tariffs, reducing profit taxes, and subsidizing needed industrial imports (p. 307). The Officers thus quickly "became aware of the difficulties of persuading this class to depart from traditional and deeply-rooted patterns of investment" (p. 227). So, after the tripartite Aggression of 1956, they decided that "bold policies were essential to raise living standards and make Egypt economically more powerful ... thus the Junta committed the economy to comprehensive planning . . . in July 1960" (p. 230).

The longest chapter in the book, the last before the Conclusion, tries to answer the question, "Is the new 'centralized market economy' better than the one it replaced?" That is, is it more efficient and is equity more widespread? Since some three years ago in a review of Issawi's *Egypt in Revolution* O'Brien concluded that "more specialized research needs to be undertaken . . . before we are in a position to appraise the present regime,"[a] it is a pity that he is forced to conclude that we still do not have sufficient data nor knowledge to be able really to answer this important question (pp. 213n, 235, 244, 258, 285, 293 and 316). But, after saying it is "premature even to ask if the socialist economic system is likely to be more efficient or equitable than the old" he does hazard the following: (1) At the "centre of the efficiency problem in Egypt" is the "question of prices" . . . and "unfortunately almost nothing is known about the pricing rules adopted by ministries and public enterprises" (p. 258); (2) consumer sovereignity has been completely sacrificed at the altar of a high rate of growth (p. 320), and (3) as for producers' efficiency, "time alone will provide the answer" as to whether it is better than under the previous institutional arrangement (p. 321).

And, after noting that the ends of economic and social action prescribed by the government are to create a "Socialist, Democratic and Co-operative Society" (p. 282), he concludes the country is not socialist (if this word has anything to do with welfare and equality, p. 293), co-operatives are not democratic nor are they widespread (p. 287), and democracy exists only "on paper" (p. 288), with the country being in the hands of a "highly efficient and benevolent dictator" (p. 289).

Despite all this, O'Brien rates the present regime above the one it superseded (p. 324). But, he made this judgment in 1966; perhaps had he been

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[a] "An Economic Appraisal of the Egyptian Revolution," *Jour. Develop. Stud.*, Oct. 1964, *1*, p. 112. O'Brien confesses that his final chapters are "exploratory essays" and promises to treat these "subjects in greater depth in a subsequent monograph" (p. xii).

writing in late 1967 after Egypt's pitiful encounter with Israel and after the first FYP had been lengthened to seven years and the two-year old blueprints for the second Development Plan had been set aside, he might have paused to reconsider.

What can one say about the Mead book? A vast amount of hard, and high quality, work obviously went into it. Ordinarily it would have represented a significant contribution towards reducing what O'Brien, in his review of Issawi's study, once called the scarcity of "solid information about Egypt." But, as Mead himself in his Introduction (p. vi) clearly points out, the publication of Issawi's book, and more particularly, the study by Hansen and Marzouk "has been quite unfortunate" in the sense that much of his work may well be "needless duplication of effort." Almost exactly like the Hansen-Marzouk study, Mead's book begins with a general historical survey, followed by the demographic background and, after chapter surveys of agriculture and industry (Mead adds an important chapter on services), we are given interpretative descriptions of the problems of Egypt's foreign trade, its financial system (mainly on the money supply and prices), and the consumption-savings nexus, followed by an essay on the Plan, its implementation, and a concluding chapter on the growth of the economy in perspective. All in all it is well done, but the main question is: was this book really necessary?

In significant matters Mead differs from Hansen-Marzouk on only a few points. In a 19-page appendix to his chapter on Agriculture he examines the Hansen thesis that there is no underemployed redundant agricultural labor in Egypt. This question, which dates back at least to 1948 when Doreen Warriner estimated disguised unemployment as being 50 per cent of the rural work force in Egypt, is still being debated[4] and it is of interest that Mead, in finding Hansen's conclusion "unwarranted" (p. 90), supports the results of more recent empirical studies (cited by Mabro). Mead then examines the proposition that Egypt's surplus labor has been transferred from the agricultural to the service sector—mainly government services—and concludes not only that this transfer did occur, but, significantly, that this was accomplished by huge government deficits. And he goes on to point out that the consequent inflationary pressures "added significantly to the authorities' difficulties" in seeking to achieve viability in the balance of payments, price stability, and increasing domestic savings.

Mead also makes the point (p. 127), increasingly made in studies of industrializing economies, that the industrial sector may not be an efficient absorber of surplus agricultural labor. But, he goes on, in his discussion of the construction sector (included in the chapter on services), to imply that, if not industry, then perhaps construction ("the fastest growing sector") may help solve Egypt's nagging unemployment problem (p. 150).

The book has no name index, and the subject index is inadequate: worse, the inclusion of a 120-page statistical appendix is rendered much less valuable by the failure to number about 80 of the appendix pages. And the cross references to text, chapter tables, and the appendix material are often sloppy. For instance, in his reference to the rapid rate of growth of the construction sector

* R. Mabro, "Industrial Growth, Agricultural Under-employment and the Lewis Model: The Egyptian Case, 1937-1965," *Jour. Develop. Stud.*, July 1967, *3* (4).

on page 150, we are referred to Table 3-2 on p. 45, which does not give growth rates at all, but this table refers the reader to appendix Table I-A-8 on page 288. So try to find page 288—it lies in a series of unnumbered pages between 280 and 291, but once having located it, we see that the growth rate, which was given as 13.8 per cent on page 150, is now shown as 14.5 per cent. And in Table 10-1 (on unnumbered page 240) we are given estimated *actual* growth rates to 1962-63 from a source dated 1960, all shown in "constant prices" of some unknown year. These examples are not atypical (*cf.* the incorrect page references given in Table 8-4), neither are they serious, simply annoying.

The purpose of the Kardouche study is best given by his subtitle, "A Study in Expansionary Finance." His aim is to use the "more recently developed frameworks of analysis" in an attempt to discover the effect of "Egypt's growth effort on its financial system" (p. vii). He covers the period from the Military take-over in 1952 to the present, although handicapped by "the lack of adequate data for the entire period"; the analysis ends in the early sixties—1964 being the latest cut-off date.

The "more recently developed framework" apparently is that emanating from the Chicago School (the book is an updating and restructuring of a Ph.D. dissertation directed by Phillip Cagan), and rather than discovering the effect of the development effort on Egypt's financial system (Kardouche really never does elaborate this subject anywhere in the book), he concerns himself with the consequences of a massive deficit-financed investment program. He examines what happens to money and real income, the money supply and the demand for money, the price level, the balance of payments and the flow of private savings when the "Central Bank is an Engine of Development Finance." The principal conclusions Kardouche reaches can be quickly summarized. In the beginning of the process, if there happen to be large foreign reserves available (Egypt's sterling balances in London earned during World War II), and a reasonable flow of foreign aid as well, the money supply will rise, but the consequent draw-down of the Central Bank's foreign assets, together with the foreign aid, will act as a shock absorber so that some semblance of price stability can be maintained. During this period, not only money but real income, even on a per capita basis, apparently is attainable. However, once the foreign assets are gone, as they were in Egypt after 1961, and foreign aid becomes increasingly determined by political factors as distinct from the needs of development, it will become more difficult to "export . . . the pressure on domestic resources which [will] result from government deficit financing" (p. 70). Private savings, for various reasons, no longer can be tapped as sources of finance (p. 75); also with domestic investment increasingly financed by treasury deficits, high-powered money will account for more and more of the changes in the money supply and indeed becomes the principal determinant of it (see Table 32, p. 127). As a consequence of this finding, Kardouche's analysis, in Chapter 6, of the currency-money and reserve-deposit ratios as determinants of the money supply, while interesting, is so only to the specialist, not on Egypt but in monetary theory.

The concluding chapter contains an interesting analysis of the income veloc-

ity of money $(V=GNP/M)$. Kardouche shows that since 1952 $V$ has steadily increased, i.e., the demand for money $(Dm)$ fell. But, during the period up to 1955-56 it did so for quite different reasons than for the later period ending in 1961-62. Kardouche first notes that during the development process one would expect the monetarized sector relative to the overall economy to increase, and thus the $Dm$ to rise. Further, since per capita real incomes should also be rising, following Friedman, we may again expect the $Dm$ to be increasing. But during his earlier period these two factors were moving "in the wrong direction"—per capita real incomes were falling, and the monetarized sector diminished, relatively, as a result of the reduced need for cash payments in the rural areas after the Agrarian Reform of 1952—so he has no trouble explaining the rise in $V$ (fall in $Dm$) which he finds. But in the later period when per capita income was increasing 3 percent per annum and the monetarized sector no longer shrinking the income velocity continued to rise, although at a slower rate. Kardouche has an interesting discussion of why this was so.

He attributes the rise to two structural influences, which outweighed the importance of the rising income effect. In other words, the luxury-good, greater-than-unity income elasticity of demand for money theory of Friedman, which in itself would have resulted in a fall in $V$ (and a rise in the $Dm$), was offset by: (1) the drop in the national income/$GNP$ ratio, and (2) the increasing importance of the government in the total economy after, say, 1957. Kardouche states that national income as compared to money is a better measure of $V$ and the $Dm$ than the $GNP/M$ ratio, and that during this latter period national income decreased relative to $GNP$ (because depreciation and indirect taxes increased relative to $GNP$). But "more important," he says, was the increasing importance of the government in the economy since "a shift in economic activity toward government lowers the 'private' demand for cash balances as a proportion of $GNP$ and thereby raises velocity" (p. 113). But since $V$ is simply a ratio between $GNP$ (or national income) and total money supply, whether or not it will rise, i.e., $Dm$ fall, as the government assumes more responsibility for investment and production within the economy, depends, one should think, on whether the government's $Dm$ is substantially different (lower) than that of the private sector. It may, or may not be, but Kardouche sees no reason to even raise the issue, simply concluding that these two structural influences "had worked themselves out by 1963" (p. 114) and that thereafter, what with real income per capita continuing to rise, $V$, along Friedman's income elasticity theory, would soon begin to fall—providing the government manages to contain the degree of price inflation. Despite the optimism about this which one can draw from the official price indexes, recent events would seem to call for a continued rise in Egypt's income velocity of money—among other things. Oh yes, the book is without any index, and the footnotes are so inconveniently tucked away near the back of the book between Appendix D and the Bibliography that one soon loses interest in checking the author's references.

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*Fiscal and Monetary Problems in Developing States: Proceedings of the Third Rehovoth Conference.* Edited by DAVID KRIVINE. New York: F. A. Praeger, 1967. Pp. xviii, 404. $12.50.

This book presents the papers prepared for the Third Rehovoth Conference in 1965 as well as the comments on them by the participants in that conference. The chief purpose of the conference was to examine and discuss fiscal and monetary problems of developing countries. Most of the papers and discussions were addressed to these problems. However, some of the papers and discussions were broader in scope than the title of the book would suggest.

The book is comprised of five sections, each of which consists of a number of papers and comments allegedly dealing with related issues. There are 24 papers in all. The papers differ greatly in quality. There are a few very useful contributions to the literature. However, there are also a large number of papers which are of a rather superficial nature: they abound in suggestions but hardly mention priorities and trade-offs.

Part I examines the nature of impediments to growth in developing states and suggests ways in which they may be overcome. In that section, John Galbraith and Simon Kuznets present some interesting ideas, but the relevance thereof to the topic under discussion is questionable: Galbraith emphasizes the existence of different obstacles to growth in various parts of the world, while Kuznets examines common elements of the growth process of the developed states. Parts II and III, which comprise the core of the book, deal with monetary and fiscal problems, respectively, of developing states. The papers and discussions dealing with fiscal problems are generally more specific and concrete than those dealing with monetary problems. This fact is not too surprising: fiscal problems of developing states are generally regarded as more urgent than monetary ones.

John Gurley's pathbreaking paper, "Financial Structures in Developing Economies," provides a useful framework in which to examine the monetary and fiscal problems. Gurley examines alternative techniques or processes for eliciting savings and allocating them to investment. The classificatory scheme presented by Gurley is fourfold: the financial method, or the debt-asset system; the fiscal technique; inflation; and central planning.

Gurley's classification is somewhat questionable [as Gurley himself implicitly recognizes in a subsequent article (with E. S. Shaw), "Financial Structures and Economic Development," *Economic Development and Cultural Change,* April 1967]. First of all, inflation may be viewed as part of the financial method—that is, it may be viewed as governmental borrowing through the issuance of non-interest-bearing debt. Secondly, central planning is not a separate technique; rather, it is a technique which utilizes both the financial method and the fiscal technique with heavy emphasis on governmental borrowing and taxation. Thirdly, self-finance is neglected. A more acceptable classificatory scheme would be twofold: processes of external finance and processes of internal finance (the latter comprising self-finance and taxation). In fact, that is the classificatory scheme employed by Gurley and Shaw in their subsequent article, cited earlier.

As Gurley points out, there are benefits and costs associated with the differ-

ent techniques of eliciting savings and allocating them to investment. The benefits and costs associated with each technique will differ with variations in the socio-economic environment. For this reason, different countries may find it advantageous to stress, or rely on, different processes. In addition, as a specific country develops, the relative profitability of the different processes may change, thereby inducing the country to alter its policies. Many of these interesting ideas are further developed in Gurley and Shaw's subsequent article.

The benefits and costs of some of the techniques are examined in Parts II and III of the book. In addition, a number of authors suggest ways in which the benefits associated with certain techniques may be enhanced and/or the costs diminished. Thus, it would have been useful to arrange the articles in these parts of the book under section headings corresponding to the different techniques.

Some of the factors affecting the degree of use of the financial method are discussed by Gurley. In addition, one aspect of the financial method—the role of the money market in supplementing monetary policy—is discussed by U Tun Wai. Wai's discussion does not delve into the cogent issues concerning the money market. In particular, it does not examine the role of the money and capital markets in facilitating the saving-investment process. In an analysis of the financial technique, the role of financial institutions in the saving-investment process should also be studied. An understanding of their role is especially important for developing states, since a number of these states have subsidized their development. This topic was largely neglected at the conference.

Inflationary financing of economic development is discussed by Harry G. Johnson in a cogent and lucid manner. Johnson argues that a moderate degree of inflation (5 to 10 per cent per year) is an inevitable concomitant of a country's efforts to mobilize its resources efficiently for economic growth. The propositions on which this argument rests are carefully stated. In addition, Johnson points out why the optimum rate of inflation is likely to be higher for an underdeveloped than for an advanced economy. Johnson also contends that a country's policy of deliberately promoting development through inflationary means is likely to retard rather than foster economic growth. This contention is made despite the many theoretical and practical arguments that have been advanced for the deliberate use of inflationary development policies. Johnson outlines the major theoretical and practical arguments for inflation as a means to development and then discusses the major defects of inflationary development policy in practice.

Amotz Morag contends that some of the drawbacks associated with inflationary financing of economic development may be mitigated. In particular, he contends that the use of bonds whose values are linked to a price index would encourage long-term private saving. Thus, Morag implicitly argues that inflation tends to discourage long-term private saving. The effect of inflation on private long-term saving needs to be examined much more carefully than is done by Morag. In this connection, a sharp distinction must be drawn between anticipated and unanticipated inflation as well as between the purchase of debt and equity securities.

Value-linked bonds are not needed as an inducement to saving if inflation were expected with certainty and people's expectations were the same: the nominal yield of bonds should so adjust as to offset any expected price change. Value-linked bonds may well, however, enhance saving if both expectations about price changes were not held with certainty and savers were risk averters or if expectations differed. Thus, the benefits arising from value-linked bonds are, in a sense, independent of the degree, if any, of inflation in an economy. However, inflations, especially hyperinflations, have not been of uniform intensity, so that the degee of price uncertainty may well increase with the degree of inflation. The benefits of value-linked bonds are likely to be greater for developing than for developed countries: the degree of both price uncertainty and risk aversion is generally higher in developing than in developed countries. However, as Morag points out, there are a number of administrative problems —such as the calculation of a price index—that are associated with the value-linked bonds, and these administrative problems are likely to be greater for developing than for developed countries. Thus, the desirability of value-linked bonds in developing states is not at all clear.

The fiscal technique is discussed by a large number of participants at the conference. There was general agreement that the objective of taxation is to shift resources from low-priority to high-priority uses. In most developing states, the achievement of a "high" rate of economic growth is considered to be a goal of paramount importance. Taxation may be used, as Nicholas Kaldor points out, to enhance economic growth by diverting expenditure from consumption to investment. Kaldor also points out that the antiquated nature of tax systems in the developing countries curtails tax revenue. Both Kaldor and Ralph Davidson, among others, make a number of suggestions for improving the tax systems. Suggestions for improving tax administration and collection received widespread support at the conference. Other suggestions, such as making the tax systems as simple as possible and increasing the weight of income-elastic taxes, received widespread support, but were recognized as being not always mutually compatible. Still other suggestions, such as the introduction of new taxes, including taxes on wealth, were of a controversial nature.

Part IV of the book deals with international problems confronting developing countries. As in Part I, the papers are not always relevant to the topic under discussion. An exception is Dragoslav Avramovic's interesting discussion of the debt-servicing problem facing the developing countries. Part V of the book comprises short papers which summarize and appraise the conference. In conclusion, this book contains a few very useful contributions as well as many papers of little value. Thus, this book will be of considerable interest to the selective reader.

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*History of Economic Relations Between Russia and China.* By M. I. SLADKOVSKII. Translated by M. ROUBLEY. New York: Davey, 1967. Pp. xii, 299. $12.75.

This book, the work of a Soviet scholar, was originally published in the Soviet Union in 1957. It reflects the then current state of relationships between

the two countries with its references to "the indestructible and mutually bene-
ficial economic relations between the two countries" and to the "principles of
proletarian internationalism and fraternal solidarity." The tone would be quite
different if it were written today, reminding one of the adage that in Commu-
nist countries only the future is certain; the past is subject to change.

The material is handled chronologically, beginning with the close of the
16th century. The first third of the book, taking the reader to the end of the
19th century, contains an interesting compilation of trade statistics. The story
it tells is one of continuous though small-scale trade contact between Russia
and China, hampered by the tremendous distances involved (in 1700, the
round trip Moscow-Peking took two years by caravan) and by efforts by the
Russian state to monopolize the trade for fiscal reasons. The development of
maritime trade between Europe and China was also an important factor in
keeping Sino-Russian trade volume at a low level because of the great differ-
ence in ocean versus overland transport costs.

When the 20th century is reached, the volume takes on the character of a
polemic and forfeits all claims to scholarly objectivity. Although the author
concedes that the Czarist government had no compunctions about joining the
scramble for spheres of influence in China, the United States emerges as the
real villain of the piece. All American policies toward China had only one end
in view: the penetration of American capital. U.S. opposition toward the un-
equal treaties had as its real purpose "to deprive Japan and Britain of their
spheres of influence in China and . . . to clear the way for American capital."
American imperialism "concealed its predatory aims behind various democratic
proclamations on the 'preservation of Chinese territorial integrity' . . . in order
to curry favor with the Chinese public and thus consolidate its position."

The Soviet Union, by contrast, is pictured as always correct and self-abne-
gating in dealing with China. As evidence of this there is the fact that the So-
viet government renounced its share of the Boxer indemnity money in 1924
and insisted that the funds go to education (Sladkovskii forgets to remind us
that the United States adopted this policy from the very start). The unwary
reader would come away with the impression that it was the Soviet Union
which was solely responsible for the liberation of China in 1945: "The defeat
of the Japanese occupation forces in Manchuria decided the outcome of the
war in the Pacific. The Japanese government was compelled to sign an act of
unconditional surrender on 2 September 1945 in Tokyo. . . . The Chinese peo-
ple warmly hailed the Soviet Army, whose heroic struggles had helped them to
avoid complete enslavement." There is no mention of the systematic stripping
of machinery and equipment from Manchurian enterprises by the Soviet
Union, retarding industrial reconstruction.

Much is made of the fact that in 1950 Russia granted a loan to China "at an
interest rate of only one percent, conditions without precedent in the financial
practice of either the Soviet Union or China." We are not told of the terms of
the 1954 loan, which is generally believed to have carried more burdensome
terms. Considering contemporary U.S. policy in Europe, the Russians were not
particularly liberal in financing trade with their new close friend and ally,
which was probably resented by the Chinese Communists.

Sladkovskii throws no new light on Sino-Soviet economic relations from

1950 to 1957; what he has to say is mainly a summary of the various agreements, without attempt at analysis. This is a fascinating chapter in history, one which is not yet adequately explored. Western scholars are of the view that China paid in full for everything she received from Russia in the way of industrial goods and technical assistance, though I have argued that the matter may be more complicated, that Russia may have made some sacrifices for the big Chinese industrialization push. It would be interesting to learn how the Russians view this subject now.

There is a story told at the outset of the book about the visit of an emissary of the Czar to Peking in 1675 and of his difficulties in dealing with the Manchu rulers. "The mandarins demanded that he submit to a humiliating ceremonial; they were arrogant and disrespectful, and finally subjected the mission's entourage to irritating regulations: the Russian merchants accompanying the embassy were forbidden to associate with Chinese merchants and were authorized to buy Chinese wares only from a specially designated store; fixed low prices were set by the authorities for the imported Russian commodities, and Chinese merchants who did not respect this ruling were severely punished." With a bit of change, this could serve as an appropriate epitaph for the era of indestructible Sino-Soviet friendship which came to an abrupt end in 1960.

This volume was translated into English and published in 1966 by the Israel Program for Scientific Translations. The English version is very good indeed stylistically, and there are occasional helpful editorial notes. One can only wonder why the Israelis chose this book on which to lavish their skill.

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*New Views on American Economic Development.* Edited by RALPH AN-
    DREANO. Cambridge, Mass.: Schenkman, 1965. Pp. x, 434. $8.95; paper,
    $3.95.

The advent of the "new" economic history has been the occasion for a generous serving of new anthologies. Thankfully, Ralph Andreano has not just added another of the same. Instead of the usual diet of one or two views on all problems, the reader is served a selection of essays—some original, some reprinted—designed "to provide . . . a flavor of the kind of work being done by economic historians today as it bears on the long period performance of the American economy."

Fittingly, the first of the book's five sections is devoted to methodology. The "new" economic historians are represented by Douglass North; the traditional role is developed through Chester Wright's classic of the 'thirties. Andreano, in his introduction and in a new essay, tries to point up the weaknesses and strengths of both schools; but in his well-intentioned attempt to show that the procedures of each are complements rather than substitutes, he glosses over some of the substantive differences which continue to this day to rend the profession.

In the second part, the colonial period is discussed in three essays: (1) the editor's longish introduction, (2) George Rogers Taylor's "American Growth before 1840: An Exploratory Essay," and (3) Richard Lester's 1938 article on

the paper currency experience of Pennsylvania in the 1720s. The inclusion of this 30-year old piece in a volume designed to illustrate current work may raise an eyebrow or two. Certainly it is not indicative of a lack of recent work on colonial times. On colonial monetary and banking problems alone, there are the recent works of E. J. Ferguson, R. B. Sheridan, and T. Thayer. Rather Lester's work is akin to some current work in both his conclusion (money matters) and his method (quantitative comparisons and conterfactual hypotheses).

Some problems of the ante-bellum growth are explored in Part III. The initial selection, Andreano's overview of the trends in welfare before 1860, is new. Here he eschews the traditional confines of the problem, the technical quibbling over numbers and the intersectoral shift model of Kuznets, to concentrate on asset formation and consumption flows. By skillfully blending aggregate variables with the experience of small individual firms (i.e., the Reed and Barton silversmiths and the Massachusetts Hospital Life Insurance Co.) and observations of prominent foreign visitors (i.e., Chevalier and Mrs. Trollope), he tries to persuade the reader that the level of living progressively improved from 1800 to 1840 and from 1840 to 1860. Also in this part, the Fishlow-Fogel controversy over the importance of the ante-bellum West-South trade is reprinted and continued in new rebuttals by each. The inclusion of this controversy is quite apt. It well illustrates: many of the traits held in high esteem by the cliometricians—the strictly delimited hypothesis, the confrontation with quantitative evidence, and the command over a broad range of primary sources; and many of those traits not so highly esteemed—the sensitivity of results to the data used. Two additional selections round out the view of the antebellum economy: one by Gallman on income estimates, the other by Fogel on the railroads. Fortunately, the latter is Fogel's address at the Mississippi Valley Historical Association meetings, which is primarily devoted to the evolution of the axiom of indispensability and only reports the findings of his more encompassing study. A stronger and, perhaps, truer flavor of current work would have been created by including instead his work on the railroads and interregional trade.

Part IV is concerned with the years before 1914; and the final section is devoted to a grand overview of American development since the early nineteenth century. The focus of the former is large-scale enterprise; there are articles by J. R. T. Hughes on tycoons, Alfred Chandler on combination and integration, and Andreano and H. F. Williamson on the petroleum industry. Also, there is a new essay by Andreano sketching Alfred Marshall's views on economic history and American development. It is a delightful but much too brief plea for the reader to investigate the insights to be found in *Industry and Trade*. The last part contains three pieces, often difficult to find—the testimonies of M. Abramovitz, R. W. Goldsmith, and S. Lebergott before the Joint Economic Committee in 1959.

The book is oriented toward the economic historian of the traditional school. In general, Andreano is successful in presenting this audience some flavors of the current work being done by economists; but some flavors are sorely missing. Nowhere is there an important example of an explicit model drawn from economic theory. Allusions to economic models are made; but no

such model is carefully developed in detail. Certainly such models are rarely found in the literature; but they are important to the economists within the profession. For the purposes of the book, a more detailed description of North's model in the introduction to the Fishlow-Fogel controversy would have been adequate; or the much reprinted Conrad and Meyer piece on slavery could have been included. On the level of the picayune, Andreano's introductions and essays lose much of their impact because they contain numerous annoying errors—some trivial, some not so trivial. For example, (1) totals from the census of 1820 (p. 147) are dated 1823, the publishing date of the digest; (2) more serious, per capita consumption of various agricultural products is claimed to have been stable between 1800 and 1840 (p. 150) on the basis of M. W. Towne and W. D. Rasmussen's production estimates which were made by multiplying a constant per capita production by population in the earlier census years.

H. LOUIS STETTLER, III

*The Johns Hopkins University*

*Postwar Economic Growth in Japan.* Edited by RYUTARO KOMIYA, translated by ROBERT S. OZAKI. Berkeley and Los Angeles: University of California Press, 1966. Pp. xviii, 260. $7.50.

This book is a valuable addition to the literature on the Japanese economy. It makes available in English the results of a Japanese conference, held in early 1963, in which some of Japan's brightest younger (e.g., postwar) economists participated. The central theme of the conference was "an empirical inquiry into the nature and causes of Japan's postwar economic growth" (p. x). Of 17 papers presented 11 are published in this volume, together with brief but useful, rather pointed, critical comments on seven of the papers.

Three papers struck me as excellent—those by Tachi, Kanamori, and Komiya. Tachi examines the role, which he considers important, of fiscal and monetary policy in Japan's postwar growth. He assumes that most of the time aggregate demand was adequate, so that the appropriate policy was to suppress consumption and encourage investment by an easy money and surplus budgetary policy. He then examines the policies taken, with some appropriately astringent comments on the system of low interest rates combined with direct credit rationing. In the fiscal area, Fujita has written an institutionally descriptive, sensible paper on tax policy and Kaizuka an interesting attempt to analyze the stabilization effect of fiscal policy (which he finds stabilizing or neutral, but in terms of an absolute level of GNP rather than taking into account the trend of growth).

Kanamori argues convincingly that Japan was able to grow between 1956-62 at 10 per cent annually rather than the planned rate of 6.5 per cent without balance of payments problems in substantial part because the dynamics of growth had a positive effect on the trade balance. Rapid innovation, productivity increases, and focus on export sectors of manufacturing all promoted exports. As the commentator (Tatemoto) points out, Kanamori does not really evaluate the importance of this set of factors relative to the fortuitous decline

in import prices, and the substantial increase in imports of foreign capital. Fukuoka's paper on the balance of payments is an unexciting exercise in model building with no empirical content.

Komiya states the major hypotheses to explain the very high rate of personal saving in postwar Japan, and effectively summarizes and evaluates the various empirical efforts at testing these hypotheses. Komiya rejects unequal income size distribution, high proportion of property in total personal income, life cycle, and low social security payments as significant explanations. He is more inclined to accept as explanations the higher than anticipated growth of personal income, the size of semi-annual bonuses, and lack of availability of housing and consumer durables finance. Our understanding of the causes of the high saving rate still has far to go.

The other papers are a mixed bag. Tsujimura ambitiously, if not fully successfully, attempts to explain Japan's low labor share in terms of the structure of (imperfections in) labor markets and the differential impact of borrowed technology. Baba examines the relationship between unionization and the labor share (there seems to be none), and finds that a rise in labor productivity seems to decrease the labor share. Mori analyzes fluctuation and growth from the results of simulation using the reduced form of a model that is not presented. Accordingly the article is very difficult to understand, much less appraise. Even so I join Shinohara in being skeptical of relying solely on the only two explanatory variables which Mori uses: machinery orders and the commercial bank loan interest rate. Noda's article on postwar Japanese executives in contrast to prewar, while not highly rigorous, is very interesting; it focuses upon an extremely important area which has been all too neglected. Niida's discussion of consumer price problems is a review of standard theory and a survey of what others have said, with limited evaluation and empirical content.

In sophistication, use of the tools of economic analysis, and in common sense, the papers in this volume generally compare favorably with most conference proceedings, and with almost all analyses of Japan's postwar economy published in Western languages. However, because each paper focuses on some specific aspect of Japan's growth, the book does not provide an overall, comprehensive appraisal of the growth process or of causal factors. The book hence does not serve as a general introductory text. It will be most useful to those seeking to approach the frontiers of our knowledge of the Japanese economy or those interested, for comparative purposes, in learning about the Japanese experience in certain areas—notably fiscal and monetary policy, balance of payments, personal savings behavior, and characteristics of corporate managers.

Professor Ozaki deserves our thanks for the arduous task of translation, on the whole very competently done, and the University of California Press is to be congratulated for making this volume available. Let us hope that equally good, more recent, conference proceedings and other important Japanese empirical research translations will also soon be made available to the wider audience of economists who do not read Japanese.

<div align="right">HUGH T. PATRICK</div>

*Yale University*

## Statistical Methods; Econometrics; Social Accounting

*The Use of Mathematics in Economics.* Edited by V. S. NEMCHINOV; English edition edited and with an introduction by A. NOVE. Cambridge: M.I.T. Press, 1964. Pp. xxi, 377. $12.50.

The reader of an expository book may hope to get (1) some understanding of the subject matter, (2) an idea of the range of topics encompassed by the field in question, and/or (3) some insight into the history of the subject, and (indirectly) about the characteristics of the readers for whom the book was intended. In the opinion of this reviewer, Western readers of *The Use of Mathematics in Economics* will find it most interesting from the last point of view.

This collection of six papers by V. S. Nemchinov, V. V. Novozhilov, O. Lange, L. V. Kantorovich, and A. L. Lurie was published in the Soviet Union in 1959; the English edition, with an Introduction by A. Nove, appeared in 1964 (Oliver and Boyd, and the M.I.T. Press). The editor, Nemchinov, has also provided a Preface and a "Postscript," and there is a short annotated bibliography of linear programming and related topics (from both the Russian and non-Russian literature) prepared by A. A. Korbut. This book and Kantorovich's *The Best Use of Economic Resources*[1] were the first major books on mathematical economics to be published in the U.S.S.R. since Stalin's death.

The six papers in this collection are almost entirely devoted to an exposition of the ideas of linear programming and input-output analysis, and their applications to economic planning at the enterprise and national levels. Nemchinov's paper, "The Use of Mathematical Methods in Economics," provides some historical remarks, together with a short introduction to the ideas of input-output analysis and linear programming, including some algebraic and numerical illustrations. In Nemchinov's presentation, topics appear to develop naturally from the ideas of Marx and Lenin.

The contribution of Novozhilov, "Cost-Benefit Comparisons in a Socialist Economy," is almost a little book in itself (158 pages). It may be viewed as a long and careful exposition, for nonmathematical readers, of the essential ideas of linear activity analysis, including model formulation, optimization, and (especially) the significance of shadow prices. These ideas are introduced and elaborated in the context of a series of examples, of increasing complexity, of problems of choosing an efficient program of production and investment to achieve given output targets. It is significant that there is practically no discussion of the measurement of "benefits"; the typical problem considered is one of minimizing the cost of achieving given objectives. (In this respect Novozhilov's contribution reminds one of so-called cost-benefit analysis of military programs in this country.)[2] Although Novozhilov's paper is organized

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[1] L. V. Kantorovich, *The Best Use of Economic Resources,* Cambridge, Mass., 1965 (English ed.). See the review by R. Dorfman, this journal, June 1966, *56,* 592-97.

[2] Professor Gregory Grossman has pointed out to me that the translation of the title of Novozhilov's paper as given in the English edition is not really correct; a better translation would be: "The measurement of costs and their effects in a socialist economy." The

around the activity analysis framework, I have no doubt that in addition to introducing his readers to these analytical concepts and methods, he has also provided them with a valuable discussion of the problems of economic planning and management in a socialist economy.

The two contributions of Kantorovich, "Mathematical Methods of Production Planning and Organization" and "Further Development of Mathematical Methods and the Prospects of Their Application in Economic Planning," carry further the exposition of linear programming and its application to economic planning at the enterprise and national levels. The first paper is a reproduction, with minor changes, of the book by Kantorovich published in 1939, in which he introduced a number of the essential ideas of linear programming. The second paper is a continuation in which he reports on various developments by himself and his collaborators since that time. Both papers are more technical than the one by Novozhilov; still, the mathematics is elementary (except for a proof in one of the appendices), and the exposition is addressed to the general reader rather than to the expert in the field.

Lange's paper, "Some Observations on Input-Output Analysis," is a concise (34 pages) treatment of the formulation and elementary theory of input-output relationships. Starting from a "two-sector" linear model interpreting Marx's discussion of "simple" and "expanded" reproduction, he moves to a general multisector formulation, including a description of investment and its effect on growth.

The final paper, "Methods of Establishing the Shortest Running Distances for Freights on Setting up Transportation Systems," by A. L. Lurie, enters into considerable detail on a number of computational methods, and would be of less interest to the general reader than the rest of the book. Its inclusion in this volume is consistent with my own information that, at least until recently, serious practical applications of linear programming in the Soviet Union (if indeed there are any) have been primarily in the field of transportation and location.

In attempting to assess the significance of the book as a whole, I shall refer to the three points mentioned at the beginning of this review. Regarding effectiveness of exposition of the subject matter presented, the contributions must be of great value to Soviet readers. Although the styles of the three main contributors, Novozhilov, Lange, and Kantorovich, are quite different, each has considerable merit. However, the repeated references to Soviet institutions, problems, and economic thought—indeed the whole context of the exposition —will probably hinder rather than help Western readers, and any of the latter who wish merely to learn something about linear programming and its applications to economic analysis will find any number of Western books on the subject more efficient for this purpose. Nor will Western experts find much new from the technical point of view.

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word "measurement" emphasizes Novozhilov's point that the costs of different (scarce) physical inputs can be measured in common units by using their shadow prices derived from the solution of the linear program, something that his more orthodox opponents denied as applying to all inputs.

As a survey of the uses of mathematics in economics the book points up two rather serious weaknesses in the Soviet habits of thinking about "economics." First, there is a notable lack of systematic study of the behavior of economic agents: consumers, producers, planners, etc. Thus it is not surprising that this volume presents us with no examples of mathematical economics comparable to the various theories of demand, production, investment behavior, general equilibrium, etc. with which we are familiar. One may wonder whether the very atmosphere of a "command economy" is antithetical to the objective study of economic behavior. In any case, Soviet economics is largely normative, rather than positive, and Soviet mathematical economics is essentially what we would call "management science." Curiously, the present volume shows only a part of what the Soviets themselves have done in the area of management science (or operations research); for example, it gives no hint of their considerable work in the theory of equipment reliability and maintenance, "mass servicing" (queueing or waiting lines), and computer simulation of industrial processes.[3]

Finally, as would be expected, there has been further work in the Soviet Union since 1959 on the topics treated in this volume. Two additional volumes with the same title and on the same theme have since appeared in Russian (1961 and 1965), as well as many other publications.[4]

Western readers may very well find the present volume most interesting for the light it sheds on Soviet economic thought, and on the conceptual framework and preoccupations of Soviet economists and planners. In his excellent, helpful Introduction to the English edition, A. Nove writes "At the time of its original publication [this volume] represented or symbolized an important turning point in Soviet economic thought. To appreciate its significance it is therefore necessary to refer briefly to the development of Soviet economics in the last two decades." Nove himself provides a brief history of that development in his Introduction.[5] Further inferences can be made from numerous remarks of the authors themselves, and in particular from the paper and "Postscript" by Nemchinov.

This last document of eight pages will no doubt seem quite remarkable to most readers of this journal, who are probably not used to seeing an editor of a book attack his own authors so sharply! Lange, Novozhilov, and Kantorovich all come in for their share of Nemchinov's displeasure. Thus: "Lange has not sufficiently allowed for the economic conditions of the expanded-reproduction

[3] See, for example, recent volumes of *Cybernetics in the Service of Communism*, Energia, Moscow and Leningrad; or B. V. Gnedenko and E. N. Kovalenko, *Introduction to the Theory of Mass Servicing*, Moscow 1966 (in Russian).

[4] See, for example, A. Zauberman, "The present state of Soviet 'planometrics'," *Soviet Studies*, 1962, *14*, 62-74; A. S. Becker, "Input-output and Soviet planning: A survey of recent developments," Memorandum RM-3532-PR, The RAND Corp., Santa Monica, March 1963; *Problemy optimal'nego planirovania i upravlenia proizvodstvom* (Problems of the optimal planning, projecting, and management of production), Moscow University, Moscow 1963; *Proceedings of a Conference on Mathematical Techniques and Soviet Planning, University of Rochester, May, 1965*, Research Analysis Corp., McLean, Va. (mimeographed) (papers by R. Judy, V. Treml, B. N. Ward, and J. M. Montias).

[5] See also A. Zauberman, "Changes in Economic Thought," *Survey*, No. 64, July 1967, 159-68.

process and attributes excessive importance to the technological interconnections and the technical coefficients. He consequently reaches the wrong conclusion that under socialism the price-wage-surplus product ratios are entirely determined by the technological conditions of production" (p. 370). Or: "The term 'differential outlays,' extensively used by Novozhilov in his paper, is insufficiently precise: 'differential labor costs' would, in our opinion, be better. . . . This more accurate terminology obviates the erroneous conception based on regarding production costs as the input of production factors. This notion is upheld by bourgeois political economy, which maintains that the value factor (sic) is not only labor but also capital and land" (p. 373). Or: "The method of objectively determined valuations (i.e., shadow prices, R. R.) proposed by Kantorovich has a definite, fairly narrow, but important sphere of application. These valuations are characteristics (indices) expressing deficiency, limitation, and scarcity of available resources; they are applicable to the economic calculations involved in discovering how best to use resources so as to insure maximum fulfilment of a production program. Kantorovich often tends to foist a universal character on the method and there he is gravely at fault" (p. 373). Finally, Nemchinov shakes a finger at all mathematical economists with a criticism that many nonmathematical, nonsocialist economists have voiced: "The main danger in using mathematical methods in economics is that the qualitative nature of the economic phenomena under study may be forgotten. As Lenin said, attacking idealist theories in physics and mathematics, the role of mathematics is distorted, whether in natural or social sciences, when substance disappears and only equations remain. . . . We must forewarn the reader against this dangerous pitfall" (p. 373).

One should not conclude from these last quotations that Nemchinov is basically critical of the contributions of his authors, or of mathematical economics in general. On the contrary, he emphasizes the "undoubted theoretical and practical value" of the papers, and he affirms without reservation that "the immense problems of planning and running a socialist economy cannot be fully solved unless the technical and mathematical basis of planning is seriously developed and considered." Nor should the reader of this review conclude from my own critical remarks that Soviet work in mathematical economics should be ignored by all except specialists in the history of Soviet economic thought. I must agree with Nove when he says, "Some western readers may be tempted to neglect the work of the Soviet economists in this field because of the unfamiliar phraseology, or they may lose patience with the intricacies of the battle with the 'vulgar-Marxist' critics of the new approach. Such readers would be well advised to take the Soviet work seriously. The USSR has inherited a first-class mathematical tradition, which is increasingly being harnessed to the task of meeting the challenge posed by problems of rational economic planning."[8]

<div align="right">ROY RADNER</div>

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*Econometric Models and Methods.* By CARL F. CHRIST. New York: John
   Wiley & Sons, 1966. Pp. xxiii, 705. $14.95.

Little more than a graduate student generation ago, would-be econometri-
cians had to search through a scattered and often opaque literature to find dis-
cussions of all but the simplest techniques. The appearance of textbooks by
Klein,[1] Johnston,[2] Goldberger,[3] and Malinvaud[4] has made the tasks of teaching
and learning econometrics significantly easier by providing increasingly sophis-
ticated treatments of the statistical techniques of econometrics. Carl F. Christ's
*Econometric Models and Methods* offers a full and careful presentation of
modern econometric techniques, and in addition it provides an extensive treat-
ment of the problems of model construction and analysis. This latter feature of
the book clearly differentiates it from other recent textbooks, which have in-
creasingly assumed that students are already familiar with details of the struc-
tural model.

The Christ book is suitable as a textbook for a year course in econometrics
for graduate students with knowledge of calculus, linear algebra, and mathe-
matical statistics. It would be possible to use the first half of the book to ad-
vantage in a course on models for students with somewhat less preparation. It
would be slightly more difficult to use the second half of the book separately,
because the material on statistical methods is very tightly written and depends
considerably on the discussion of models in the first half.

*Econometric Models and Methods* is divided into three parts. Part I is pri-
marily concerned with what the author calls a "guided tour" of the book.
Using a familiar linear market model, Christ investigates the effects of an ex-
cise tax, and in the process he cleverly introduces most of the concepts and
problems of model construction that are discussed in detail in Part II.

Part II is a manual for model construction. The first chapter discusses an
exact (nonstochastic), static model. Subsequent chapters generalize the model
to allow for stochastic equations and dynamic adjustments. Each version of the
model is introduced by examples; a market model and a simple income deter-
mination model are used for this purpose throughout Part II. Then each
model is discussed in a general form which anticipates the notation and prob-
lems treated in the later statistical sections.

Part II contains careful definitions of the concepts of endogenous, jointly
determined, exogenous, and predetermined variables. There is an exceptionally
clear demonstration that lagged endogenous variables need not be predeter-
mined in cases where the random disturbances are serially correlated. Unfortu-
nately, at the time this demonstration is given, the reader is not aware of the
statistical reasons for being concerned. Furthermore, the author never dis-
cusses the remedies that are available when the serial correlation is unavoid-
able.

Each chapter is followed by a set of questions and problems. The easier ones

[1] L. R. Klein, *A Textbook of Econometrics,* Evanston 1953.

[2] J. Johnston, *Econometric Methods,* New York 1963.

[3] A. S. Goldberger, *Econometric Theory,* New York 1964.

[4] E. Malinvaud, *Statistical Methods of Econometrics,* Chicago 1966.

will help the student solidify the chapter material; the harder ones will challenge him to extend the theory. Part II also contains several sections that review elementary concepts of calculus and probability, which probably should have been placed in the appendix along with the review of linear algebra.

Part III, over half of the book, is devoted to empirical methods. The first chapter of this part discusses the role of statistical inference in econometrics. The approach is classical, but there is some reference to recent decision theory or Bayesian approaches to econometrics. Properties of estimators are considered with great care. In particular the discussion of asymptotic properties avoids most of the errors found in earlier textbooks. The text is complemented by well-referenced footnotes that clear up a good deal of the confusion generated by the profession concerning the use of moments of limiting distributions as opposed to asymptotic moments.

The next chapter is devoted to the notion of identification. The treatment is in the Cowles tradition, and the exposition is particularly clear. Formal conditions for identification are derived for the linear structural model, and an extension to models that are linear in parameters but nonlinear in the variables is given. The market model example is used effectively to introduce the basic ideas of identification and also to discuss identification through information about the random disturbances.

The two major chapters of Part III discuss estimation and testing of econometric models. Many readers may object to Christ's deemphasis of single equation least squares, which is still, after all, the workhorse econometric technique. The focus of Christ's attention throughout the empirical sections is, however, the structural model. Material related to single equation problems is presented in a very compact form, which makes it less suitable as a source for students primarily interested in these problems than the earlier Johnston or Goldberger texts.

The estimation chapter proceeds systematically through least squares estimation of simple and multiple regression, limited- and full-information estimation, and two- and three-stage least squares estimation of the structural model. Christ distinguishes three basic statistical models according to the distributional assumptions made concerning the random disturbances and the predetermined variables, and for each of these models he derives the properties of the various estimators. For the most part the derivations are complete, and comparative results for the different models are tabled for easy reference. Christ's proofs of the asymptotic properties of the estimators, particularly the estimators of the structural model, are distinctly more satisfactory than those found in recent textbooks, and in many cases more general than those found in the original sources. In several places Christ provides tables which reconcile the notation used and properties proved by different authors in discussing a particular model or estimation technique. For example, the Theil, Basmann, and Christ treatments of two-stage last squares are compared in this way.

Christ has made what I consider an unfortunate choice of matrix notations. The designation, $y = X \beta + u$, for the linear regression model, seems to be the choice of most of the profession; hence Christ's use of the transposed version, $y' = X' \beta' + u'$, is somewhat bothersome.

The chapter on the evaluation of models and estimates presents the usual tests of hypotheses for parameters of single equation models. In addition it discusses extensions to multi-equation models and the use of asymptotic tests for structural parameters. The Durbin-Watson test for autocorrelation is given detailed treatment, together with the related results of Hannan and of Theil and Nagar. Procedures for testing econometric models on the basis of their predictions are given for both reduced form and structural equations. Despite the earlier emphasis on dynamic aspects of the models, however, there is no discussion of such problems as testing for dynamic stability.

The final chapter of the book outlines the construction, estimation, and testing of a seven equation econometric model for the United States. The model is in the spirit of Klein-Goldberger and provides an interesting summary example for the techniques developed in the book. The computational aspects of econometrics, while of primary importance in any practical problem, are often ignored in the process of teaching the subject. Christ's model could be made the basis for a series of computational exercises. Using the data provided by Christ, students could be asked to duplicate results and compute estimates based on different techniques; or they could be asked to apply the model to different sets of data.

The Christ book has had a long gestation. The result, however, is a careful and complete econometrics text.

RICHARD W. PARKS

*University of Chicago*

*Application of an Input-Output Framework to a Community Economic System.* By FLOYD K. HARMSTON AND RICHARD E. LUND. University of Missouri Studies Vol. XLII. Columbia: University of Missouri Press, 1967. Pp. xi, 124.

In this brief book, the authors distill their experience in making and using input-output tables for a number of communities of about 20,000 inhabitants. For readers with little or no previous experience with input-output, they explain carefully the advantages of the input-output approach over a simple community multiplier, recommend certain ways of defining sectors and their outputs, describe various sources of data, and discuss applications of the table.

The how-to-make-a-table chapters are the most valuable and deserve the attention of anyone involved in the study of an urban economy. The authors advocate one basic deviation from the national input-output practice. In national tables, trade "sales" are really trade margins. In the authors' practice, the entire amount of a consumer's purchase from a retail store appears as a purchase from the retail trade sector. Since nearly all of the items sold at retail will be imported into the community, the commodity composition of these purchases is largely irrelevant. This direct treatment saves a lot of labor in making the table.

The authors repeatedly emphasize that the cost of preparing a community matrix is about the same as the cost of an economic base study of a conventional sort. Use of the input-output concept, they believe, makes it possible to get more mileage out of almost the same research.

The chapter on "Applications" at the end of the book disappointed me because the "applications" seemed to be purely hypothetical. I had hoped for illustrations of how input-output had helped in making specific decisions. The earlier chapters suggest that a future volume by the same authors could tell us of such applications.

<div align="right">CLOPPER ALMON</div>

*University of Maryland*

*Sopostavlenie pokazateley promyshlennogo proizvodstva SSSR i SShA* (Comparison of the Industrial Output Indexes of the U.S.S.R. and the U.S.A.). By A. F. REVENKO. Moscow: Statistika, 1965. Pp. 148.

This competent monograph by a young associate of the U.N. Statistical Office and the Soviet Ukrainian Academy of Sciences consists of (1) a punctilious comparison of the U.S. and Soviet methods of collection, classification, and calculation of statistics of industrial output and employment, and (2) recalculation of the U.S. 1958 census data by Soviet methods in order to compare the actual levels of industrial output and labor productivity of the two countries. In the study of comparative methodology Revenko has made a step forward from the known Soviet work in the field (N. Grachev, I. Bushmarin, I. Nikonova *et al.*). His comparison of product classifications in the two countries also surpasses everything known to exist in our literature here. Some of his methodological findings deserve special attention. He points out, for example, that the U.S. and Soviet output statistics *in natura* sometimes are not exactly comparable because Soviet data may include an interplant consumption of one's own output, while U.S. data on shipments would not; this seems particularly relevant to the output data of electric power, iron and steel, machine building, metal, and wood-working industries. At the same time, Soviet "gross output" indexes in value terms do not include such interplant consumption, and therefore are not always comparable with unofficial indexes calculated from Soviet data *in natura*.

On the other hand, in the calculation of the levels of development of the U.S. and Soviet industries, Revenko's contribution is somewhat less impressive. Essentially, he has done here what already was done by others in the West—except for some new details. By using output data for 263 comparable products, amounting to about 50 per cent of the total value of industrial output in both countries, he calculates that, in 1960 (with U.S. price weights), Soviet industry as a whole produced 58 per cent of the U.S. output. In iron and steel production the U.S.S.R. has attained 80 per cent of U.S. level; in fuel industries, 50 per cent; in chemicals, 30 per cent; in consumer goods, 53 per cent, and so forth. On their own terms these results can hardly be disputed. However, Revenko chooses to contrast his findings with similar calculations by Tarn, Campbell, Greenslade, Jasny *et al.*, and dismisses them as either exaggerated or understated, or simply "false." In his diagnosis Revenko is quite accurate. All Western authors have failed thus far to include enough of the sufficiently representative Soviet machine-building products in their indexes, and this is the main reason why their indexes differ so markedly from the official Soviet series. Yet in his own index Revenko includes only 22 ma-

chine-building products which together comprise only four per cent of the total machine-building output in both countries! And the reason is probably the same: just like his American counterparts, Revenko lacks any better Soviet machine-building statistics, and must use only those which are available in the official source books. Hence, in this respect his calculations are no better than those which he criticizes. We must still wait for a more equitable representation of machine-building in all unofficial indexes of Soviet industrial output.

Revenko's calculations of the comparative labor productivity show that, in 1960, in value output per man-hour worked, the Soviet Union attained a 47 per cent level of U.S. productivity, when Soviet weights are used, and 52 per cent of U.S. level, if U.S. weights apply.

VSEVOLOD HOLUBNYCHY

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## Economic Systems; Planning and Reform; Cooperation

*The New Industrial State.* By JOHN KENNETH GALBRAITH. Boston: Houghton Mifflin Co., 1967. Pp. xiv, 427. $6.95.

By the time this review appears, most readers will be aware of its subject and will have been exposed to the immediate controversy following publication. That Galbraith is more fortunate than those who may wait a year or more for reviews in academic journals, is due to the literary quality of his writing, to his standing as a man of affairs (with which is associated a considerable sense of public relations), and to the real element of originality in his arguments. It is not without experience that he writes of the management of demand, and few of us who rely on purely informative advertising to sell our academic wares will regard the relative sales statistics without envy.

For the professional analytical economist, it is essential to accept from the outset that Galbraith is dealing in loose but not necessarily unreal concepts, of whose descriptive value he seeks to convince by a mixture of literature and some logic, based on casual observation, induction, and selected evidence. Thus, his "Technostructure" is an organism of large autonomous cells, interacting, but not colluding, in a manner that justifies sometimes treating the whole *as if* it were a unified elite. His objectives are also wider than those of traditional "political economy." He is concerned not only to influence public attitudes on strictly economic questions, but to suggest the broader social implication of his total picture; in other words, he aspires to contribute as much in the field of political science as in what is now regarded as the proper field of economic science.

A question of special concern to the profession, however, should be dealt with first, namely, Galbraith's assertion that "mainstream" economic theory has totally failed to come to terms with oligopoly, management control, and "advertising." Although it is a secondary theme, it is a charge which cannot be ignored, if only because of the size of the audience. We can then examine his alternative economic system which consists, in effect, of two elements—a

skeletal growth model of the corporation similar to at least one of the existing "managerial" models ( ! ) and a considerable body of politico-socio-economic flesh which is altogether fatter and pinker. Finally, we may try to evaluate the conclusions.

However hard the feelings caused by the manner of attack, there is surely a higher truth in the charge against "traditional" economics; and I, for one, would regard Galbraith's irreverent style as particularly justified in an area where there has been so much naiveté. He has found some remarkably revealing quotations from distinguished neo-classical economists, and has been lucky in having an unbelievable pamphlet put out by the Department of Commerce fall into his hands shortly before he went to press: like the classical theory of the relation between real wages and unemployment in the Papal Encyclical, *Quadragesimo Anno*, contemporary economics cannot deny responsibility for publications like *Do Yon Know Your Economic ABC's.?*[1]

It has been replied that there has been a continuous study of oligopolistic pricing since Hall and Hitch, and that Galbraith presents a caricature of contemporary microtheory taught only in elementary courses or on backwoods campuses. But, if I may say so, under the American system, "Econ 1" is the only economics most citizens ever get, and one suspects their considerable number forms a significant element in Galbraith's best-seller readership. It also appears that the mathematical and scientific convenience of the so-called competitive model, whose rediscovery coincided with a period of increased demand for intellectual rationalizations of western capitalism, and the subsequent success of the classical revival, has made the pressure for "approved contradiction" more intense, rather than less, as compared with, say, fifteen years ago. We who have merely grumbled must pay respect to Galbraith for his more spectacular performance. Furthermore, it seems that the widespread interest in Galbraith at the present time is by no means confined to the lay public and undergraduates. A substantial proportion of graduate students appears to be similarly affected.

A common response has been to assert that the "competitive model" provides a reasonable explanation of actual behavior; i.e., it is an adequate approximation or working hypothesis. This has been said both of the working of the price mechanism and in debating the question of profit maximization. In the first instance it is usual to refer to a body of econometric literature which is supposed adequately to explain observed results without resort to unconventional hypotheses; the references, however, are rarely provided. What, in truth, is shown by the classical econometric studies of consumer demand (and especially by the most recent and sophisticated) is that equations employing conventional variables, such as price and income, cannot explain a high proportion of the variance in per capita consumption unless they are either modified to include time trends in "tastes" or alternatively expressed in dynamic forms involving explicit parameters relating to stocks, stock depreciation, accumulated habits, and habit decay. Substantial effect from price and income tends to be essentially indirect, i.e., works by triggering cumulative processes of stock

[1] U.S. Department of Commerce, 1965, cited several times by Galbraith with hilarious effect.

accumulation or habit formation, processes which in static models would ap-
pear as trend. Consequently, it is perfectly possible that marketing efforts of
producers are successfully directed to influencing the magnitudes of these para-
meters (for example, the coefficients measuring the sensitivity of durables pur-
chases to existing stocks). The experiment has yet to be tried. All we can say
now is that, given a path of income, the development pattern of consumer be-
havior in the United States is largely controlled by a set of parameters whose
relative magnitudes cannot, in fact, be explained in terms of existing economic
theory.[2]

In the case of the profit maximization and all that, I do not think that any-
one familiar with the statistical relations found in observed data relating to the
growth, financing, and internal rates of return in listed corporations can hon-
estly claim that these are easily or adequately explained by the hypothesis
that the corporations are generally attempting to maximize the present value of
their equity: to say that the latter is still the best hypothesis we've got is to
say that we have no satisfactory hypothesis at all. Galbraith's critics here, as
well as in the price theory field, appear to rely as much on assertion as Gal-
braith himself—which is not to say (see below) that his own alternative to the
profit-maximizing model is adequate.

Another line of defense has been to suggest that alternative economic hy-
potheses such as growth-maximization, in the case of the firm, turn out to have
much the same long-run implications as the traditional model. But enough
work has been done on these models by now[3] to show that this is a complete
fallacy. A very serious criticism of Galbraith is that he does not tell his general
reader how and why the predictions differ,[4] which leads us to his model.

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[2] I have particularly in mind Houthakker and Taylor, *Consumer Demand in the United
States,* Cambridge, Mass. 1966, as well as earlier classical studies. In the Houthakker
studies, the stock-adjustment coefficients (Beta) for the nine durable-type goods for
which a dynamic model was fitted, ranged from —.5 for new cars to +.3 for jewelry and
watches (the positive values representing cases where the commodity failed to behave like
a durable). Taking the example of new cars, suppose that in the absence of cumulative
effect of the marketing of the industry over the past decade (including model changes,
built-in obsolescence efforts etc.), the Beta-coefficient would have been lower algebraically
by 0.25; then, if I have done the arithmetic right, the projected growth rate of per capita
sales would be lowered from three per cent per annum to below two per cent per annum,
representing a difference of billions of dollars in total annual sales in the 1970s.

Since the above was set in print I have had the opportunity of reading Professor Houth-
akker's 1967 Presidential address to the Econometric Society, entitled "Are There Laws
of Consumption?", which will be published in 1968 in the Society's *Proceedings.* He
attacks the "vulgar view that consumers' purchases are largely the result of advertising
pressure," but it is not clear from the text that he would disagree with what I am saying
here. I have discussed the matter with Houthakker and he has agreed to this statement.

[3] See, for example, John Williamson, "Profit, Growth and Sales Maximization," *Eco-
nomica,* Feb. 1966, *46,* 1-16.

[4] See the footnote on page 172. Galbraith cites Shorey Peterson's article "Corporation
Control and Capitalism," (*Quart. Jour. Econ.,* Feb. 1965, *79,* 1-24), but Professor Peterson
is only one among many who have made this error. It can be shown, for example, that on
empirically supported quantitative assumptions, a corporation that maximized growth
subject to a minimum level of stockholder welfare might grow twice as fast as an other-
wise similar corporation that chose the growth-rate that maximized stockholder welfare,

Galbraith describes the modern corporation as an institution whose power is based on its capacity to command a newly defined factor of production, namely, technical knowledge, skill, and information, embodied in a coordinated team of human brains—the so-called Technostructure. The Technostructure comprises virtually the entire white-collar membership of each organization and functions by a process of continual information-exchange. Top management, in his picture, has less power and significance than is popularly supposed; group decisions predominate at all levels. The resulting behavior is a sociological product of the group situation: the motives of the corporation are generated by the goals of its middle class employees. They can, however, be subjected to economic analysis.

The goals listed by Galbraith are autonomy, growth, and the opportunity to express technical virtuosity. The last named (attributable to the role ambitions of the technicians) represents a major new idea. Autonomy is desired for its own sake and not merely to guarantee the livelihood of the managers; consequently, the corporations resist interference even when profits or growth are not threatened. These motives yield a lexico-graphic utility function with the following order of priorities: (1) a secure level of earnings, (2) growth, (3) rising dividend rate, and (4) virtuosity.[5]

The result of the striving for these goals is a general Galbraithian picture of an environment for both work and consumption which is as much the product of the inner needs of the Technostructure as of those of the external society. Because modern production requires intricate planning, uncertainty must be reduced, and this is done by "managing" demand through advertising. In the resulting linked-development of want creation, want satisfaction, and innovation, wants which do not provide outlets for technical virtuosity will tend to be ignored, and a variety of other consequences will ensue. These are not easy to summarize, but I will make the attempt by dividing them into two categories —strictly economic, and politico-economic. The list does not claim to be exhaustive.

1. *Strictly economic:* (a) high managerial risk-aversion; (b) a faster rate of product innovation and lower growth of leisure preference than would otherwise occur or be desirable; (c) general invalidation of economic theory founded on the concept of consumer sovereignty.

2. *Politico-economic:* (a) business support for government policies to stabilize aggregate demand; (b) reduction or elimination of conflict between management and labor unions (because the interests of the latter, whose power is declining anyway, increasingly coincide with those of the Technostructure); (c) lack of interest in projects to relieve poverty if these do not provide outlets for technical virtuosity; (d) bias in favor of war and armaments production, because these do provide such outlets; (e) increasing association with government and convergence towards socialism.

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and that, contrary to the traditional view, the situation would be permanent, i.e., the faster-growing firm would not be penalized. Consequently, in the long run, managerial motivation tends to drive out traditional.

[5] This is my interpretation of page 176.

To begin the evaluation, it is necessary to examine the economic model. The minimum level of earnings is expressed as an internal rate of return on capital-employed sufficient to avoid the need for heavy borrowing and to keep share-holders reasonably quiet. The rising dividend rate, which has a substantially lower priority, is desired to achieve a degree of orthodox prestige. There is no indication, however, that internal return and dividend rate may be related: they are clearly separate goals. This must be a mistake, because whatever one's view of stock market behavior, one must surely accept that investors are con-cerned with the whole path of dividends and/or capital gains and prepared to trade off expected future growth of dividend against the current level. Conse-quently, the value of the share is a much more meaningful indicator of prestige than the specific rate at which the dividend is rising. By the same token it is the real indicator of security. It is then easy to show that there must be a close relation between growth rate, internal return, and stock market value, which has, in turn, important implications for Galbraith. In the first place, it becomes impossible to treat the level of rate of return and the growth rate of dividends as independent, because once we know one, we know the other. In the second place, the model implies a definite relationship between growth rate and inter-nal rate of return all along the line, even when the constraints are not effective. Galbraith appears to recognize this but his account is confused. He does not, in my view, see the implications.[6] He does not recognize, for example, that, if the achievement of a secondary goal involves a sacrifice in profitability, it also in-volves a sacrifice in growth, even when the minimum level of profitability is supersatisfied. (Alternatively, he may be assuming that, provided the minimum is satisfied, there is no restraint on leverage, which is not very plausible.) He remains correct, however, in implying that the chosen growth rate will be faster than in the case where only the stockholders' welfare is considered (cu-riously, even that is not said in so many words).

Another inconsistency is that, having destroyed the notion of consumers' sovereignty, all subsequent statements about the social consequences of the system must represent personal value judgments. It is not entirely clear that Galbraith accepts this. And the fact that he expresses the value judgments of many of us and expresses them very much better than we could ourselves is only partly relevant.

Whether or not inconsistencies are culpable in themselves, they are clearly significant when they affect the conclusions. This they do, in several cases, and the qualifications are by no means concentrated in the strictly economic sector. Let us draw up the balance sheet beginning on the credit side first. The conclusions about the conversion to Keynesianism are obviously correct, and

[6] "A secure level of earnings and a maximum rate of growth *consistent with the pro-vision of revenues for the requisite investment* are the prime goals of the technostructure" (p. 176, italics added). The only way I can understand the italicized passage is to assume the author is implying the existence of an additional independent relationship between growth and profitability, in the sense that the activity required to accelerate growth may adversely affect profitability (see Williamson, *op. cit.*, or for that matter my own previous work). Galbraith could then have a model: $p = p(g)$, $g = r.p$, hence $g = r.p(g)jr$ to be chosen so as to maximize $g$ subject to a minimum on $p$; where $p$ is internal return, $g$ growth-rate, $r$ retention ratio. The $p(g)$ function, however, is nowhere that I can find explicitly discussed. See also the footnote on page 172 already mentioned.

most would accept the conclusion relating to the role of labor: these conclusions are not exactly new, but they have not previously been drawn in the same way or from so broad a general picture: Galbraith does deserve to be judged on his total effect, and to be given credit for the sweep of his analysis. The explanation of the bellicosity of contemporary American managerial capitalism is suggestive, more or less new, and seems both more subtle and more convincing than the usual neo-Marxist account. It comes wrapped in a superb essay about the economic bases of the Cold War that I, for one, would like to have read by every reader of Rostow's *The Stages of Economic Growth.*

On the debit side, the conclusion that professional management will be especially averse to risk is seriously oversimplified. They will have a "safety-first" type of utility function, but it is not entirely obvious that the disaster level in this function will necessarily produce a greater general aversion to risk than that of the stockholders, who may also have this kind of utility function. Over the segment of the probability distribution above the disaster level, managers could well be *more* reckless of profits than investors, since they do not themselves pay directly for the losses, and at first sight suffer no penalty provided the outcome stays above the safe minimum. On further consideration, one can see that they will pay a penalty in capacity to grow, in which case it is difficult to make any firm qualitative predictions on this point. Galbraith makes what I consider to be another clear mistake here; he is, however, in company with almost every economist who has previously considered the question.

The conclusions that the corporations will not undertake, for example, low-cost housing development because this provides no outlet for technical virtuosity implies both that the difficulty could be overcome if a suitable technical challenge in industrial housing development could be provided and conversely that the mere provision of cash to subsidize rents would not overcome it. Here surely, Galbraith is tripped up by his inconsistency concerning the growth motive. It is true that at the present time the great corporations have shown little interest in a technological revolution that could provide satisfactory housing cheaply enough for the present urban poor, but I would argue that this is not only for the obvious reason that the prospect lacks profitability, but because, in turn, unprofitability would react on growth. Given the U.S. taxpayer's political dislike of subsidizing the consumption of others, as things stand at present, corporations that behaved altruistically would grow slower than those that did not. We can, therefore, predict that merely providing a technical outlet will not do the trick. On the other hand, we can easily agree that providing both cash and technical outlet would be likely to succeed. The acid test of Galbraith's hypothesis would be the outcome in the event that cash was provided without any special steps on the technical front. We cannot tell without trying the experiment,[7] but would it be worth considering whether it would perhaps be more fruitful to advocate channeling federal funds (on a scale comparable with current expenditure on military R and D) into R and D on industrial housing rather than to advocate direct subsidies to the local governments? If so, the inference would flow directly from Galbraith's total picture, turning

[7] Is the underutilization of existing federal programs due to deficiencies in the techno-structure or in city government?

debit into credit, and providing a fine example of the potential contribution of his method just when the lack of rigor appears to have let him down.

Finally, we reach a group of conclusions where the verdict is more complex. His conclusion that the growth-motive brings the system to create new wants, other than leisure, at a faster rate than the traditional theory would predict is very probably correct. It is true at the micro level, and in the last chapter of *Managerial Capitalism*, I tried to prove that, given the micro model, it would seem to be true at the macro level as well. It is also true that once the corporations have the power and the incentive to create wants to any significant extent, our existing notions of the meaning of consumer sovereignty require radical revision. Galbraith may have overstated the argument from advertising, but the general conclusion would stand even if all but the most purely "informative" advertising could somehow be stopped. Galbraith cannot have it both ways and imply, as he does, that the slowing up of leisure preference is necessarily wrong, especially as so many new products are complementary with leisure. We need a new welfare economics which can provide a logical and testable means for evaluating alternative possible *changes* in tastes without loss of scientific validity. I am convinced that this will be the most important task of the profession in the next fifty years. For all the criticisms one may make, I believe Galbraith's work as a whole, including his previous books, will contribute significantly to creating a climate of opinion in which the task can better be recognized.

As to the prediction that the industrial system will converge to socialism, I have always argued that "managerial" capitalism is a complex and not entirely stable blend of traditional capitalism on the one hand and of Burnham's vision on the other. It retains many traditional elements—including an important veil of property—but behaves very differently in a number of important respects from a system of corporate institutions in which the gray flannel suit was truly immanent and the stockholder truly a vicarious (profit maximizing) entrepreneur. The actual system innovates faster than would this imaginary system (Galbraith incidentally does not adequately acknowledge his debt to Schumpeter) but is no better adapted to furthering social justice or responding to externalities. Strictly socialist systems are slower to create consumer wants, but better adapted to meet, for example, the needs of the old and the poor, and in practice really do perform better in these areas. We have to admit that it is almost exclusively in the "free world" that we observe the extremes of poverty and affluence side by side. Convergence would seem to me to require from the "free" or "western" system either a considerable sacrifice of corporate autonomy or the development of a much greater capacity to use the western political process to encourage the central government to manipulate the rules of the game (meaning the industrial environment) much more profoundly than it has done hitherto. I agree with Galbraith that the organization men defend autonomy for its own sake, for which there is new evidence every day. But I think it is not unfair to suggest that the arguments of his present book must imply that, if by some means both the concept and the reality of the common stockholder were overnight abolished by law, and a system of self-financing autonomous industrial trusts put in place of the present system, it would still be

impossible to solve the problems with which we are all concerned and which were discussed in the *Affluent Society* and elsewhere. I am sure this implication is wrong. Direct interference with industrial autonomy might continue to be resisted, but I am convinced that the political conditions would be so greatly changed that government manipulations of the rules of the game would become very much easier indeed. At the end of the book Galbraith advocates a political lead from the educational and scientific estate. I think he may underestimate the legal and institutional (not to mention constitutional) changes that would be required for our influence to have the relevant effect, however scarce a factor of production we may have become.

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*Sorevnovanie dvukh sistem. Ekonomicheskie sopostavleniia* (Competition of the Two Systems. Economic Comparison). Edited by V. N. KHRAMELASHVILI. Akademiia Nauk SSSR, Nauchnyi Sovet po Kompleksnoi Probleme "Ekonomicheskoe Sorevnovanie Dvukh Sistem i Slaborazvityie Strany." Moscow: Nauka, 1965. Pp. 430.

*Pokazateli ekonomicheskogo razvitiia socialisticheskikh stran. Metodologiia sopostavleniia i analiza* (Indicators of Economic Development of the Socialist Countries. Method of Comparison and Analysis). Edited by T. V. RIABUSHKIN. Akademiia Nauk SSSR, Institut Ekonomiki Mirovoj Socialisticheskoi Sistemy. Moscow: Mysl', 1966. Pp. 319.

*Ekonomika socialisticheskich stran v cifrach. Kratkii statisticheskii sbornik* (Economies of the Socialist Countries in Figures. Condensed Statistical Handbook). Akademiia Nauk SSSR, Institut Ekonomiki Mirovoi Socialisticheskoi Sistemy. Moscow: Mysl'. Annual. Pp. 247.

It lends an ironical twist to the Communist economic theories that their ultimate analytical criterion of economic development is a comparative performance of the capitalist and particularly of the U.S. economy. Needless to say, that is related to their materialistic interpretation of history which, of course, has also undergone a considerable change from a simplicist prediction of an immediate collapse of capitalist economy to a present proposition that the countries of the socialist bloc must first create the "material-scientific-technological" base of communism. This means, in brief, to be able to outproduce the capitalist economy and its main protagonist, the United States. As a consequence, the communist economists engage now in a very pragmatic search for (1) a system of economic indicators suitable for comparing economic performances under different social conditions; (2) a uniform methodology for utilizing foreign statistics to this purpose; (3) a way how best to incorporate in the communist economic plans the growth factors discovered in the United States and elsewhere. Ultimately, the results would be used for formulating Soviet economic policy toward the undeveloped countries. The overall responsibility for such a broadly conceived program of studies is entrusted to the Soviet Academy of Sciences "Scientific Council for the Complex Problems of Economic Competition of the Two Systems and Undeveloped Countries," while

the execution of the studies is left to the Academy's and Executive department's specialized economic research institutes.[1] The three publications reviewed here are a sample of the results now flowing in ever-increasing number from these activities.

The main topical issues, occupying the greater part of the first book, are the conceptual, statistical, and structural problems in the international comparisons of economic performance, growth, and national wealth. The remainder of the book includes several case studies, for instance, of the chemical industry in England, agriculture in France and Canada; and a variety of information concerning nonprofit organizations in the United States, institutional arrangements in the COMECON, organization and tasks of economic research in the Soviet Union, etc.

Obviously, it is the first part of the book which deserves most of the comments. Here, undoubtedly, the articles by L. B. Al'ter, A. N. Notkin, M. V. Baranov, V. M. Kudrov, A. I. Katz, V. N. Sobakinskikh, to name only a few, will be of considerable interest to all who analyze and ponder over the structure and compatibility of the U.S.A. and U.S.S.R. economic indicators. However, I would like to single out for the reader's attention M. V. Kolganov's contribution which best indicates the scope of discussion going on among the communist economists with respect to conceptualization of their own tools of analysis. As it turns out, Kolganov successively attacks some of the most fundamental criteria of Soviet economic theory and practice although still (and necessarily so) with arguments sprinkled with references to Marx.

First, he rejects the social product as a meaningful yardstick of performance of national economy. He correctly charges that this concept is based on the individual enterprise-accounting principles (rather than national economic criteria), its total includes intermediate production and is affected by the institutional organization of the economy, putting an undesirable stress on the volume of production to the detriment of national economic efficiency. For Kolganov, economic efficiency can be better measured and ensured if social accounting is based on the final product which more meaningfully expresses what a community really requires. That Kolganov wishes to stress the role of final demand and consumption is clear from his subsequent criticism of Ia. A. Kronrod, who, a rather traditional Soviet economist, has now come under attack also from other reform-minded economists. Kolganov chiefly opposes Kronrod's thesis that economic growth (i.e., extended reproduction in Marxian terminology) is primarily determined by the rate of investment in the producers' goods industries. This is the proposition which led the communist planners to concentrate on investment in heavy industries. But Kolganov suggests, and S. M. Nikitin's analysis supports his stand, that optimal economic growth can only be achieved when the rate of investment in the consumers' goods as well as in the producers' goods industries are more or less equal. Ultimately Kolganov

[1] Among the most important Academy establishments are: Economic Institute; Institute for World Economy and International Relations; Economic Institute for the World Socialist System; African Institute; Institute for the Asiatic Nations; Geographical Institute; outside the Academy, the Gosplan Economic Research Institute; Institute for Business Cycle Research at the Ministry of Foreign Trade; Labor Research Institute of the State Committee for Labor Problems and Wages, etc.

also objects to the communist concepts of national wealth as consisting exclusively of the tangible products of human labor, although he stops short of proposing that the money values of unimproved land and natural resources be included in national wealth estimates.

Of course, the innovative spirit is present in other articles as well. Thus, L. B. Al'ter, Deputy Director of the Gosplan Economic Research Institute, considers the communist concept of national income—that is, Net *Material* Product (NMP)—as totally unsatisfactory for measuring standards of living and proposes a total of NMP and the money values of *all* services instead. Nevertheless NMP remains, as is obvious from all the articles, the fundamental criterion of a state's economic might which, rather than welfare, is the purpose behind Soviet economic accounting.

The book edited by Riabushkin presents the partial results of statistical research undertaken in the Academy Economic Institute of the Socialist World System. Territorially, however, it covers only the COMECON European members and, in some instances, Yugoslavia. Its main objective was to construct the comparative economic indicators for these countries to facilitate the COMECON efforts to harmonize their economic planning and also to explain their somewhat diverging economic growth rates.

Interestingly enough, the analysis brings into the open a number of conceptual divergences preventing the full comparability of the communist indicators. To illustrate: Romania includes all communal services in NMP, while all others exclude it; on the other hand, Romania, the U.S.S.R., and Czechoslovakia include only freight transportation in NMP, the others do so with respect to all transportation. Yugoslavia counts all expenditures on defense, public health, education, etc., as investment; all others, as consumption. Moreover, the particularities of the communist countries' price systems and of their currency exchange rates foreclosed a comparison of absolute levels of NMP, investment, etc., so that the entire analysis is based on the respective national indices and is carried out in terms of the structural changes of the economy, relative shares of its components, and growth rates. In this way the entire economy is first examined; then, separately, the industrial and agricultural sectors and the labor force in the respective countries. The final chapter is devoted to a comparison of communist countries' economic performance with that in Western Europe. Needless to say, the editors give full credit to the communist doctrines and planning for the rapid growth rates and industrialization of such previously agricultural countries as Bulgaria but shun an appropriate analysis of the declining rates in the two most industrialized, East Germany and Czechoslovakia.

The third book, by now an annual publication of the same Institute, offers the most essential statistics on population, production, investment, and trade for all countries of the bloc, with some data for China and Albania in recent years. In spite of the fact that the statistical coverage varies in depth from one country to another and from one annual edition to the next one, it is still a useful source of quick information on countries as, e.g., Mongolia, whose statistics may not otherwise be readily available.

JAROSLAV G. POLACH

*Resources for the Future*

*Problems of Regional Economic Planning.* By J. R. BOUDEVILLE. Chicago:
Aldine, 1966. Pp. 192. $6.00.

In a period when the dialogue between French and Anglo-Saxon economists
is far from fluent, it is gratifying to find in English a book by someone no less
qualified than a professor of economics at the University of Paris. It is even
more gratifying—certainly for us in the United States—that the subject is one
about which we know and have done comparatively little, and which, at the
same time, might almost be termed a French speciality.

This study is an elaboration of lectures presented by Professor Boudeville at
the University of Edinburgh. Perhaps the greatest weakness of the work is
that the elaboration was not as thoroughly done as it could have been. How-
ever, at least part of the difficulty may be the result of a poor translation. Sen-
tences such as "It is nevertheless more difficult each year to gear imports
through a policy of total domestic demand and the promotion of exports be-
comes more and more stochastic with the disappearance of traditional markets
and the opening of new ones" (p. 147) may leave the reader baffled, or angry,
or at least unhappy about his own mental impotence to comprehend such
deeply scientific truth. Also, it does not add to the ease of reading the book to
find that about one-third of the more technical derivations and deductions are
trivial, and another third so involved and poorly explained that one has a hard
time to figure out what is going on unless he is already familiar with the theo-
rem in question.

But leaving all of these more or less minor technicalities aside, it is time to
say quite frankly that Boudeville's work is very useful and instructive. One
learns from it several things: some about the general nature and institutions of
French overall and regional planning, some about the basic philosophy and
spirit of those who participate in the planning activity, and finally, some about
the very substance of the scientific discipline of regional economic planning.

With respect to the last-mentioned category, one would conclude that the
field is a young one because, judging from Boudeville's work, a lot of it hinges
on, if not consists of, technical definitions, and its more positive or operational
content (i.e., regional planning models and procedures) appears to be lacking
unity, and almost direction. While technical definitions abound, it is hard to
come by a clear definition of regional planning as a discipline or activity. The
closest Boudeville gets is to say that "It is the consequent response to enlarge-
ment of local market through the road transport revolution." Or, "It is . . . the
straightest, if hardest way to secure the participation of the entire nation in a
concerted economy and a collective economic decision" (p. 154).

Of general interest is Boudeville's attempt to evaluate the performance of
French planning by comparing the incremental products of aggregate gross in-
vestments between France and four other advanced economies. All considered,
France comes out on top. Actually, the comparison between France, Germany,
and Italy is even a good deal more favorable for France than suggested by
Boudeville. This is so because he neglects the fact that with considerably
higher rates of growth (6.5 per cent for Germany compared with 5.0 per cent
for France), the fraction of net in gross investment is far higher, and thus the
comparison of *net* incremental capital coefficients (more relevant here) must

turn out more favorable for the slower-growing country than does the comparison of gross coefficients.

If we were to subdivide all of economics under two headings, "mechanics" and "efficiency," the subject of regional planning would—judging from Boudeville—fall primarily under the former; of course, this presupposes that we classify "avoidance of bottlenecks" under the first rather than the second heading. The two *leitmotifs* under the heading are quite French, or at least French-based; the first revolves around Peroux's "spaces" and "propulsion," the other follows the Quesnay-Leontief path of inter-sectoral and inter-regional flow-consistency.

Before concluding, we may use Boudeville's study as a background for answering the pertinent question whether the comparative neglect of regional economic planning in the United States, both as a government activity and as a scientific discipline, is a reprehensible omission or just a natural consequence of a lesser need for regional planning. All considered, it seems that unless we include under the heading of regional planning the solving of the problem of American cities, the answer lies closer to the second alternative. France, after all, had a Louis XIV to prepare for the prominence of the regional problem three hundred years later.

JAROSLAV VANEK

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## Business Fluctuations

*Economic Recovery in Britain 1932-39.* By H. W. RICHARDSON. London: Weidenfeld and Nicolson, 1967. Pp. ix, 337. 63s.

Once upon a time there was a kingdom that waxed fat (well, at least some members of that kingdom waxed fat) on the fruits of world colonization and its accompanying industrialization. But as time passed the special circumstances that had witnessed the rise of this State no longer prevailed and want and disillusionment spread across the land. So much so, that when those who had suffered from these changes came to look back they could find no better term for those years than the "Hungry Thirties."

It is perhaps fitting that there should have come from present-day "swinging" Britain a work that claims cooly to dispel the myth of the "Hungry Thirties." Unemployment you say? "The persistence of large numbers out of work," answers Mr. Richardson, "reflects the efficiency of recovery far more than its incompleteness." How cool can you get? Certainly, Mr. Richardson cannot be accused of emotional overtones. With Schumpeter on one side of him and the bound volumes of the London *Economist* on the other, to say nothing of a contingent of the most learned articles in the van, he advances to the attack. After a preliminary discussion of Britain's position in the 1930s vis-à-vis the rest of the world, he proceeds to analyze the changes in British industry, consumption, investment, housing, trade, and monetary and fiscal policy.

With what result? Well, those who come to this volume in the hope that they might witness new skills in the art of myth-killing will be disappointed. Terms like "stagnant," "depression," and "poverty" are, after all, almost devoid of any analytical utility. Also, those familiar with recent quantitative evidence and business cycle theory will find themselves nodding agreement or impatiently skipping large chunks of the book. Sometimes, as with the chapters on "The Housing Boom" and "Cheap Money" one feels that Mr. Richardson is "swinging" dead as well as cool cats. And there are one or two awful moments in the narrative when, unintentionally, the writer seems to be implying that ultimately it was the war that saved Britain (i.e., the best way to recovery is to get yourself an armaments boom!)

Fortunately there is more to Richardson than this. Not least, in pressing his case that the years 1932-39 were years of revitalization and readjustment, he is able to blend unpretentious narrative with crystal clear economic analysis. Not that he makes any pretence at breaking new ground or enriching us with brilliantly new ideas. His essential contribution is to tell us what we already knew in a way that makes trade cycle theory meaningful and interesting. It's the kind of book that would have pleased the Greeks who stressed form. It's a book that should be put in the hands of young students, particularly those whose first brush with academic economics has led them to the unfortunate conclusion that economists are delphic oracles, speaking in riddles, with several different voices.

Richardson could not speak more clearly and no one can read his book without becoming a little better informed about a critical period in British history, a little more conscious of the economic achievements of these years, a little more aware of the optimistic side of the coin. And yet there *were* millions of Britons whose only sustenance in the 'thirties was cold-hearted, shame-faced, public relief. No one can accuse the Pilgrim Trust Report *Men Without Work* (1938) of exaggerating the condition of the unemployed, but some parts of that report make sad reading. One didn't *have* to dream up countless factory chimneys smokeless against the sky; there *were* whole valleys and towns blighted with the loss of work, and with it the loss of pride and self-respect and will and purpose; great shipyards *did* stand as silent as the grave; men living above rich seams of coal *did* suffer for want of a few pennies for fuel; bands of lean grey men *did* march across the land in their hundreds to protest their bitterness before the walls of Westminster; in a rich, proud land long lines of ill-clad, ill-nourished people *did* stand before soup kitchens in the streets. It is fit and proper that the harsher hues of the past should be toned down—that we should strive to see things in perspective. We shall never find any one single verdict that will do justice to the 'thirties anymore than to any other decade. Yet the "Hungry Thirties" will not be argued away. And the perspective that we seek must escape us as long as we believe, as Richardson evidently does, that this movement is comprehensible in economic terms alone. This, surely, is to make a false claim for economic analysis. It is to suggest that to dissect the economic phenomena of the 1930s is to dissect the whole history of the period. It is all well and good to abstract and isolate the economic factor from the rest of life provided we are not deceived into believing that what we

have abstracted is the cause of the changes we are studying.

Richardson's book is a most competent and valuable explanation of what happened to the British economy during the 1930s. Being only a part explanation it must leave the myth of the "Hungry Thirties" pretty well where it was. For these years were not only years of revitalization and readjustment, they also were years when economic efficiency was allowed to eclipse that other old-tried criterion of a healthy economic order: equity.

WILLIAM WOODRUFF

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## Money, Credit, and Banking; Monetary Policy; Consumer Finance; Mortgage Credit

*Issues in Banking and Monetary Analysis.* By GIULIO PONTECORVO, ROBERT P. SHAY AND ALBERT G. HART. New York: Holt, Rinehart and Winston, 1967. Pp. ix, 231. $7.50.

The papers included in this volume grew out of a seminar on banking and monetary problems sponsored by The Graduate School of Business and the Department of Economics at Columbia University in 1965-1966. The volume includes three papers on problems of banking and financial institutions, three papers on monetary policy, and three on international financial problems. Each paper is preceded by a short introduction by the editors and followed by a critical comment (though none of the comments is very critical). Whatever the limitations of this volume, it is clear that the seminars must have been unusually interesting.

In the first paper, Almarin Phillips discusses the factors making for structural inefficiency in the U.S. banking system. The factors limiting effective competition in banking are not solely those of structure, but are also inherent in the attitudes of both bankers and supervisory authorities towards competition, as Phillips has pointed out elsewhere. The outlook of Phillips' paper is rather pessimistic when one considers that the suggestions for reform that he presents are most unlikely to be achieved in the foreseeable future. His first suggestion, for example, is that the dual banking system should be abolished. However, improvement may not require the far-reaching legislative changes that he urges. It is hard to accept Phillips' conclusion that "There have been no major changes in banking regulation and supervision in recent years." Phillips also concludes that the Bank Merger Act of 1966 "reduces still further the power of the Department of Justice to intervene in mergers." Recent developments do not bear out this view of the legislation and it is likely that in the future the automatic injunction power given to the Justice Department will be a very important tool of antitrust policy in the bank merger area.

In a very provocative paper, Hyman Minsky discusses the role of the money market in facilitating financial intermediation. Minsky discusses the relationship of the firm's balance sheet to the marginal efficiency of investment sched-

ule and argues that improvement in financial institutions and financial markets raises the schedule. This means that financial innovation becomes as important as real innovation. This also means that instability in the financial markets will have a clear and direct effect on stability of real investment. This paper ties together in very neat fashion two important contributions of Professor Minsky; his concern with innovation and change in the financial process, and his concern with the dangers of money market and financial instability.[1]

The paper by Marvin Rozen presents a very competently done survey of the "Competition for Funds between Commercial Banks and Savings Institutions." Rozen concludes that the increased attention given to savings by commercial banks in recent years is likely to continue and that "banks will be more, rather than less, interested in savings in the future." Further narrowing of the differences between commercial banks and other savings institutions will result. Rozen is correct in his view that this convergence in the recent past has been mainly due to the heightened interest of commercial banks in the saving field, but it is probably true that in the future the principal spur to convergence will come from the entry of savings institutions into a broader range of financial activities.

Rozen discusses briefly the problems posed by regulation of this increased competition among financial institutions. He recognizes the special problems of failure in the financial industry as well as the allocative inefficiencies of overregulation. His conclusion is to shift the objective from failure prevention to third party compensation. He suggests several ways in which this could be carried out, ranging from the proposal for variable deposit insurance premiums based on risk, to the elimination of limited liability for financial institutions.

The volume includes two papers, one by Warren Smith and one by Arthur Smithies, which set out and manipulate relatively simple models in a way that makes them particularly useful pedagogical devices. Smith's model aims at showing how substitutions involving money, time deposits, and securities influence the effectiveness of monetary policy. The paper is a good exercise in monetary mechanics and he is able to analyze a number of interesting monetary policy problems within a relatively simple framework. Smithies' paper is also a good exercise for the student and achieves its goal of showing the interaction of fiscal and monetary policy measures. This is particularly true in Smithies' handling of the problem of a balance of payments deficit.

It has become fashionable in recent years to view free reserves as a poor indicator of the state of monetary policy. In an admittedly exploratory paper, Albert G. Hart finds free reserves (actually the ratio of free reserves to required reserves) to be the monetary variable most closely linked with business investment decisions. The evidence is not presented in the traditional form of regression equations, but rather in an ingenious series of charts. In a Commentary on the paper Deane Carson quite properly indicates some reservations about this resort to "eyeball empiricism." It should be recalled, however, that these papers were prepared for presentation to a seminar and Hart deserves

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[1] See his "Central Banking and Money Market Changes" *Quart. Jour. Econ.,* May 1957, and "Can 'It' Happen Again," in Deane Carson, ed., *Banking and Monetary Studies,* Homewood, Ill., 1963.

some commendation for his courage in drawing conclusions on the basis of preliminary investigations.

The three papers on international finance comprise the least satisfactory section of the book. George Halm discusses the merits of greater exchange rate flexibility and, while rejecting freely fluctuating exchange rates, does conclude that the band within which exchange rates are allowed to fluctuate should be somewhat widened. While Halm advocates the band proposal as a *compromise*, in an interesting commentary, Hart suggests that the band proposal may be an *optimal* solution because of its greater effect in discouraging destabilizing speculation.

Ira Scott's paper discusses the development of new forms of international long-term borrowing in recent years. The article provides support for Minsky's stress on the importance of innovations in finance.

Peter Kenen discusses the requirements of a supernational monetary system in terms of the frequently drawn analogy between international and interregional payments adjustments. To the objection that a monetary system such as he describes requires a considerable sacrifice of national sovereignty, Kenen points out that this sacrifice had already taken place when the major industrial countries opted for stable exchange rates and pledged themselves to work for freer trade.

The above comments indicate that, in my view, the papers included in this volume are of generally high quality. This does not necessarily mean that it is a worthwhile venture to put these papers between hard covers and sell them for $7.50. The papers do not make a consistent whole; there is no single theme running through the volume; and there are few if any courses for which the volume would make a suitable text or collection of readings. Published in various professional journals the papers would be more accessible to the economist and to the student than they are in this form.

PAUL M. HORVITZ

*Federal Deposit Insurance Corp.*

*Studi sulla moneta.* By PAOLO BAFFI. Milan: A Giuffrè, 1965. Pp. iv, 371. L. 3200.

Upon reading Dr. Baffi's collection of articles written during the postwar period, one wishes that many more Western central bankers would be impelled, and would also have the necessary time, to write about the theoretical ingredients and historical background of their banks' policies. Such literature would undoubtedly clear up several aspects of contemporary monetary policies, especially as regard the latter's efficacy. Academicians and even those associated with international monetary organizations can hardly be expected to make this contribution.

Baffi's book consists of three parts, i.e., Monetary Analysis, International Problems, and Italian Monetary Policy. The third section makes up 70 per cent of the volume and presents commentaries on Italy's monetary problems during the two decades 1944-65. Students of the country's economy will find it

essential to read this material since much can be learned about the relationship between monetary stability and economic growth, the inflationary process, the role of money in the business cycle, etc.

The author's inquiry and conclusions are of general interest to the extent that Italy epitomizes the problems of developing countries. Although postwar experience has shown that monetary policies have undeniable potentialities for both economic expansion and control of aggregate demand, their implementation must take account of the sensitivities of employment on the one hand and of the balance of payments on the other hand. Since Italian employment and international accounts are unusually vulnerable to credit tightening, the government has to pursue an effective incomes policy.

According to Baffi, the stability of Italy's economy depends largely on high rates of income growth (as a basis for accommodation of union wage demand —provided that the latter are justified by productivity gains); low government expenditures; comparable increases in industrial and agricultural production; and rising incomes abroad. Unquestionably, Italy has learned that economic prosperity elsewhere causes her exports to expand and emigrant remittances to soar. Conflicts between monetary stability and economic growth arise when the economic system loses its condition of equilibrium, i.e., when, according to Baffi, disproportions arise in availabilities of real resources, in the supply of labor, and in the marginal productivity of capital and labor.

Italian economic conditions during the years 1961-65 make a good case for the premise that rapid economic expansion and inflationary pressures are inseparable, as was evident also throughout the postwar Italian boom. The basic symptoms of the 1961-65 conditions serve as a reminder of the early postwar disequilibrium of 1946-47, which was corrected by the Einaudi monetary stabilization.

Baffi points out convincingly that these two situations differed quite meaningfully. In the 1946-47 disequilibrium, rising domestic prices maintained some balance between upward pressures in certain markets and increasing costs, while the lira depreciation prevented international prices from differing significantly from the internal price level. As a result, profits were not squeezed as drastically as they were during 1962-63 when Italian firms had to resort to heavy bank borrowing in order to cover high labor and other costs. Because of inadequate profit margins and liberal imports, domestic production was depressed and investment curtailed. But it was this chain of reaction that arrested inflationary pressures as well. With this Italian experience in mind, Baffi presents the view that, when economic expansion is burdened by cost inflation, the expansion may be terminated when a substantial portion of the internal income flow buys imports. Baffi stresses that this can occur (and has occurred in Italy to some extent) without (any) decrease in domestic liquidity. The fact is, however, that the 1963 restrictive credit measures, employed by the Bank of Italy, reduced total liquidity from 1140 billion lire (1963) to 972 billion lire (1964). Whereas in 1963 the annual increments in bank loans, deposits, and currency were, respectively, 24, 16 and 19 per cent, those for 1964 amounted to only 10, 9 and 8 per cent, respectively.

In summary, Baffi's book is a valuable contribution to a better understand-

ing of both Italy's monetary management and adjustment processes within a dynamic open economy.

KAREL HOLBIK

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*Money, Banking, and the United States Economy.* By HARRY D. HUTCHIN-
SON. New York: Appleton-Century-Crofts, 1967. Pp. xviii, 456. $6.95.

This new money and banking textbook has much to commend it for use in the market for which it is intended. That market consists of those money and banking courses offered in economics departments (or in business schools by economists) where highly sophisticated and rigorous textbooks are inappropriate. That is, it is an easy text, but a fairly good one; and that is something of a rare combination.

The author achieves his results through a strategy of (1) seeking fairly limited teaching objectives and (2) pursuing those objectives with care and patience. Thus the text is not (as some are) encyclopedic in its scope: to the contrary, some instructors may not approve of the author's choices of topics to be omitted or to receive slim treatment, some of which will be noted momentarily. What is dealt with is handled well, and students of even limited capacities ought to be able to follow the broad outlines of the monetary system, of monetary theory, of the international financial system, and of policy problems. Virtually no use is made of algebra, none of calculus, and "steepness" and "flatness" concepts substitute for elasticities.

Unlike many other relatively easy money and banking texts, Hutchinson's is clearly not designed with business-school use in mind, as its sole concern is with economic issues, principally aggregate theory and policy. Indeed, one of the text's weaknesses consists of its light treatment of the financial system *qua* system, and of financial institutions other than commercial banks. There is one chapter on "The Role of Financial Institutions," a non-analytical cataloguing of the major financial intermediaries, with no discussion of dealer and broker markets, and with no reference to money markets. There is a brief discussion in a later chapter of the possibility that loans by nonbank intermediaries can "facilitate increases in velocity," a possibility which the author refers to as the "Gurley-Shaw thesis."

Other matters given short shrift are the issue of bank regulation and supervision (as distinct from monetary policy); the role of other policy devices, particularly fiscal policy; and the historical experience of the United States with problems of instability and with efforts at stabilization through policy. Incidentally, one might be misled by the title into thinking that the text lays particular stress upon American institutions and history; if anything, less emphasis is placed on these than in most other texts.

Occasionally the author's strategy of selectivity fails him, and he chooses to deal with a topic in such a cursory or simplified manner that one wonders why he didn't omit it altogether. There are discussions, for instance, of the commer-

cial loan (or real bills) doctrine and, elsewhere, of the commodity theory of
money which are insufficiently sharp and defined, so that the student may won-
der in each case what it was that the author has shown to be a foolish theory.

More serious are the weaknesses in the discussion of the quantity theory.
Four theories are presented: "the crude quantity theory," which is dismissed
as demonstrably incorrect; the Fisher equation of exchange, with assumptions
that velocity and real transactions do not vary; the Cambridge cash-balance
equation, which the author incorrectly identifies as equivalent to the Fisher
equation; and the "New Friedman Quantity Theory," which is said to differ
from the preceding three only in that money determines the value of output
(real output times price level) rather than only the price level. The notion of
the demand for money does not appear in the chapter at all, though of course
that is what both the Cambridge and Friedman theories are all about.

With the exception of a few paragraphs, the book could have been written
in its present form ten or fifteen years ago. That this is so reflects, once again,
the author's strategy of discussing only the major themes of monetary econom-
ics, and ignoring the intricacies. There is no discussion of the elasticity of de-
mand for money, of portfolio-adjustment theory, of supply-of-money theory,
or of other subjects found in the contemporary literature.

In writing a relatively easy book the author has covered his path well, and
made few statements which would not be defended by the vast majority of
monetary economists. He gives proper weight to conflicting viewpoints, is not
doctrinaire about the strengths and weaknesses of monetary policy, and is nei-
ther excessively uncritical of the authorities nor excessively controversial. And,
students will not feel "talked down to," as they must when reading some
widely used economics textbooks.

Perhaps the reviewer has made too much of the simplicity of the book. Its
difficulty is not on a par with the texts by Chandler, Hart and Kenen, Barger,
Harris, etc. But it is definitely a college textbook, and one that will be attrac-
tive to a great many instructors and students.

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## Public Finance; Fiscal Policy

*Negative Taxes and the Poverty Problem.* By CHRISTOPHER GREEN. Washing-
    ton: The Brookings Institution, 1967. Pp. xiv, 210. $6.75; paper, $2.50.

*Poverty, Income Maintenance, and the Negative Income Tax.* By GEORGE H.
    HILDEBRAND. Ithaca: New York State School of Industrial and Labor Re-
    lations, Cornell University, 1967. Pp. iii, 68. $1.50.

Considerable attention has recently been directed at the idea of a "negative
income tax" as a means to alleviate poverty. The idea is a simple one. It would
use the structure of the federal income tax to provide allowances to the "poor"
(or certain groups of the poor) which diminish as income rises. Although the

idea seems simple enough in theory, its application is much more complicated than one may envisage. For example how does one define the "poor"? Should the present federal income tax definition of income (AGI) be retained or should it be revised to include all money income? Should public assistance be counted as income of the poor or should it be excluded? Should the negative tax system extend assistance to all poor regardless of the cause of poverty or should it be limited in coverage? How would a negative tax system affect incentives to work? Perhaps most important, how much would it cost? These and a host of other issues are raised in the monographs by Green and Hildebrand.

Although the basic objective of the two authors is similar—to discuss the issues involved in the use of the federal income tax system as a means of alleviating poverty—the books differ in coverage. Green's book offers a more comprehensive and technical treatment of the poverty problem and the possible use of transfer-by-taxation plans to alleviate it. On the other hand, the Hildebrand monograph is more oriented to the casual reader; it presents a less technical description of the major negative income tax proposals and provides a most illuminating summary comparison of these proposals.

Both Hildebrand and Green basically accept the definition of the poor established by the Social Security Administration for different family and individual units, i.e., $3,130 (at 1964 prices) for a four-person urban family, $2,190 for a farm family, $1,540 for single adults living alone in cities and $1,040 for single individuals on farms. According to this poverty index, there were 34.1 million poor in the United States in 1964. It would take about $11˙ billion to raise the incomes of these persons so that they would no longer be poor.

How would a negative tax system contribute to achieving this objective? Hildebrand considers nine plans. The essential ingredients of all these plans are: (1) a guaranteed minimum level of income, (2) a tax rate applied against a specified tax base, and (3) a break-even level of income where the tax liability equals the guaranteed allowance. The Friedman version, the simplest of all negative tax plans, calls for a transfer of money from the Treasury to an eligible tax-reporting unit (for instance the family) "at a rate of 50 per cent of the amount by which the total value of exemptions and deductions exceeds pre-tax gross taxable income" (p. 13). As an example of how this scheme would work, Hildebrand considers a reporting unit consisting of four individuals (two parents and two minor children). Their total exemptions and deductions are $3,000 ($2,400 for four exemptions plus a $300 deduction for the filer and a $100 deduction for each of the other family members). If the family has no money income whatever, then it would receive a payment from the Treasury of $1,500. This is calculated in two steps; first earned income (in this case equal zero) is deducted from the value of total exemptions and deductions and then the 50 per cent rate is applied to this difference.

The other eight plans differ from the Friedman plan in two main respects: (1) the tax·base for computing the allowance—the value of exemptions and deductions or a fixed allowance per head within the tax-reporting unit against which other income would be offset; and (2) a full vs. a fractional guarantee of

the minimum ("poverty line") income to the reporting unit. All plans except the Friedman plan and one of Lampman's plans (plan I) rest on the allowance method of determining the tax base. All plans but two (the Schwartz and Theobald proposals) propose fractional guarantee of the SSA poverty income.

In Chapters 4 to 7, Hildebrand discusses the nine plans in detail, pointing out their advantages and disadvantages, their costs and some of the administrative problems which would arise if any one of them were adopted.[1] Although Hildebrand's discussion does not suffer from a lack of clarity, it is still confusing to follow and absorb the details and issues surrounding these nine plans. By the time one reaches the concluding chapter, the idea of negative taxation loses its attractiveness as a "simple" plan to alleviate poverty, and it is not at all obvious that a negative tax plan is a workable solution to the poverty problem. As Hildebrand himself puts it, "there are enough difficulties inherent in the negative income tax to warrant consideration of alternative ways to strengthen income maintenance as a device for relieving poverty" (p. 61).

Green's monograph is much more extensive in coverage than Hildebrand's. Not only does Green discuss major negative income tax plans (Friedman, Lampman, Tobin, and Schwartz), but also the so-called "social dividend plans" devised by Lady Rhys-Williams, Robert R. Shultz, and D. C. Smith. His study may roughly be divided into two parts. In Chapters 2 and 3 Green explores the idea of transfer-by-taxation and develops its relevance to the problem of poverty in the United States. In Chapters 4 through 9, Green describes these transfer-by-taxation plans comparing the advantages and disadvantages of the social dividend plans with those of the proposed negative income taxation plans. Chapter 10 is a summary of the discussion at a two-day conference of experts on the subject.

Chapter 9 is the core of Green's study. In this chapter the author devises nine transfer-by-taxation plans and estimates their cost to the government and benefits to the poor and non-poor, outlining the issues and the problems which arise in each case. The nine hypothetical plans may be grouped as follows: (1) five plans (A-1, A-2, B-1, B-2, and plan C) are negative rate plans; (2) two of the plans (D-1 and D-2) are social dividend plans. (A social dividend plan differs from a negative taxation plan in that it would guarantee income payments to all families and finance the guarantee through a tax on all income.); (3) the remaining two (E and F) have special features that distinguish them from negative taxation plans.

Based on 1964 census data and allowing for no adjustment due to the expected reduction in public assistance payments after a transfer-by-taxation plan is in effect, or for the possibility of excluding public assistance income from the definition of income for a transfer-by-taxation plan, the costs of these plans would range from $4.4 billion for the negative rates plan (A-2) to either $41.4 billion or $51.3 billion for the social dividend plan (D-2). If public assistance payments made in 1964 were excluded, the cost of plan (A-2) rises to $6.8

[1] If, for example, the Friedman plan were adopted, it would cost the Treasury something between $1.5-$11 billion (1963 data) depending on its effect on work incentives and assistance payments. However, at a maximum it would close only 30 per cent of the "poverty gap."

billion and for (D-2) it rises to $43.3 or $53.2 billion. As for benefits, Green found that two-thirds of the allowances, under a hypothetical negative tax rates plan, "would be received by families in which the formal education of the head did not go beyond the eighth grade" (p. 147). Fifty-five to sixty per cent of the allowance would go to families with children and only slightly more than 25 per cent would be received by families whose head worked full time for forty weeks or over.

How would these negative rate taxation plans be financed? Green offers three alternatives: deficit finance, tax increase, or the use of the full-employment surplus. As for the social dividend plans, he prefers a special tax schedule for this purpose. In the Rhys-Williams scheme, social dividend payments would be financed by a proportional tax on all income which would require a rate close to 40 per cent. Other government expenditures would be financed by a surtax, starting on income above £600. In the Shultz plan, a progressive income tax schedule is suggested to cover both the cost of his plan as well as other government expenditures.

As Green notes, if a social dividend plan were adopted in this country and were financed by a 40 per cent tax on income combined with the present tax rates, the marginal tax rate would in some cases exceed 109 per cent (p. 81). Green's example cannot be taken too seriously, since if a comprehensive social dividend plan were adopted, present federal income tax rates (and thus revenues) would be substantially reduced since welfare payments which account for over 25 per cent of total federal expenditures would no longer be needed.

This brings us to a basic issue on which both Green and Hildebrand take a somewhat ambiguous position, i.e., the issue of whether a negative tax plan should or should not replace existing welfare programs. The goal, regardless of how it is to be achieved, is to help the poor. Existing welfare programs do in fact make payments to people who do not need them and at the same time fail to reach some of the needy. A properly designed negative income tax on the other hand, would offer full or partial coverage to only the poor. In the conference discussion summarized in Green's book, a majority of participants considered negative income taxation plans as a supplement to rather than a substitute for present public transfer and service programs. Yet the great appeal of a negative tax scheme, as originally proposed by Friedman, is that it could replace the maze of existing programs designed to raise the incomes of the poor and accomplish the goal more efficiently. As just another addition to the potpourri, its main selling point is lost.

Another critical issue revolves around some of the provisions of the present tax system. Although both authors (particularly Green) discuss at some length the various problems involved in integrating the negative tax scheme with the existing positive income tax system, e.g., the definition of income for tax purposes, horizontal and vertical equity, the "notch problem" and administrative problems, neither reaches the conclusion that a successful negative income tax must be accompanied by a thoroughgoing reform of the positive tax system. Instead, they both are willing to seek ways to avoid the problems in the present positive tax system rather than to change it to make the negative income tax integrable with it. Clearly any negative income tax scheme which is based

on the provisions of the present positive income tax, with all the inequities involved, would be an inefficient means of alleviating poverty. Imposition of an efficient negative income tax system has to be accompanied by substantive tax reform or be created as a program apart from the present tax system. It is hard to rationalize having two tax systems with different rate structures, income definitions, and allowances. On the other hand, as a practical matter a negative income tax system may only come about if it is kept apart from the power struggles involved in tax reform. The point is that neither Green nor Hildebrand takes a clear position on a negative tax coupled with tax reform vs. a negative income tax system set up apart from the existing positive tax laws, yet surely this is an issue the proponents of negative income tax system will have to face squarely at some point. If equity is as hard to build into a negative income tax as it has been to put into the positive income tax, one cannot help but be pessimistic about its prospects.

Both of these books provide the reader with a clear grasp of the issues surrounding the idea of a negative income tax and the structure of alternative negative tax schemes. They will likely be standard reference works for public finance specialists; they will be even more widely read if and when the world situation provides more leeway in the federal budget for new domestic programs.

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*Fiscal Policy Models of the British Economy*. By ELIAS T. BALOPOULOS·
    Amsterdam: North-Holland Publishing Co., 1967. Pp. xii, 313. $14.0 0

This book is number 47 in the series "Contributions to Economic Analysis" published by North-Holland, and its contents amply justify its inclusion in a series so titled. Balopoulos' book is a stimulating study of the analytical problems involved in incorporating fiscal parameters into a large scale econometric model and then using the model to assess the efficacy of past or contemplated fiscal actions. The structural model is for the British economy and thus many of the complications arise from the tax structure of the United Kingdom, but the problems of getting fiscal parameters into the model are so general and his techniques for solving them so illuminating that the book should be read by anyone interested in fiscal policy, and particularly economists engaged in constructing and using large-scale econometric models as an aid to policy formulation.

In general, Balopoulos' procedure is as follows: (1) first he carefully constructs and estimates (with simple least squares) tax functions for personal income taxes, corporate taxes, and "other" taxes (in each case starting at the micro-level in his analysis); (2) he then combines these and re-estimates each function with two-stage least-squares in the context of an aggregate model of the economy where GNP is taken as exogenously determined to obtain aggregate tax functions for and estimate the "built-in flexibility" of the tax system; and finally (3) he estimates a short-run model of the British economy where GNP is endogenous and uses the results to assess the im-

pact on the "target" variables of various fiscal actions, to obtain measures of "built-in flexibility" and "built-in stability" of the tax system (as of the period close to 1960), and to evaluate the possibility of having used fiscal policy to achieve the desired value of certain "target" variables in 1961. One chapter (Ch. 2) represents something of a digression into consumption theory, where Balopoulos seeks to relate personal income taxation and the "new consumption theories" (those incorporating permanent income and wealth). The discussion of personal income taxation, the consumption function, and the forms and applications of his final (endogenous GNP) model deserve particular comment.

Balopoulos' treatment of the personal income tax (Ch. 1) should be required reading for economic model architects and those interested in the theory of fiscal policy. One has to be uneasy about the treatment given the personal income tax function in most econometric models, especially if the models are to be used to generate simulations involving tax changes. Where specified at all, the personal tax function usually takes the form of a linear relationship between (personal) money income and personal taxes. Yet by its very nature the personal income tax function reflects a host of institutional variables—those determining the tax structure (rate schedules, exemptions, exclusions, deductions, etc.), the distribution of income, demographic variables, etc.—which are not made explicit in the usual tax function. Balopoulos seeks to remedy these defects by constructing a tax function which accounts for the more important institutional variables, viz., the rate structure, the distribution of income, the allowances and exemptions structure and demographic variables, as well as income itself. An estimate of the *average tax liability* $\bar{e}$ is generated in terms of the provisions of the tax laws and average income $\bar{Y}$ (as defined for tax purposes). Given the tax structure, values of the demographic variables, and the distribution of income, $\bar{e}$ is written $\bar{e} = a_0 + a_1 \bar{Y}$, where $a_0$ and $a_1$ are constants reflecting the institutional setting, estimated by generating values of $\bar{e}$ for arbitrary values of $\bar{Y}$ from the definitional equation relating $\bar{e}$, the institutional variables, and $\bar{Y}$ (and using least squares). When a fiscal parameter, demographic variable, or the distribution of income changes, $\bar{e}$ changes for each value of $\bar{Y}$, and $a_0$ and $a_1$ can be re-estimated. Since the aggregate tax liability $E = N\bar{e}$ (where $N$ is the population), aggregate tax functions of the form $E = A_0 + A_1 Y$ can be estimated for different assumed values of the institutional variables and the revenue impact calculated, or, alternatively, actual changes in $E$ can be allocated to the effects of changes in institutional variables on $A_0$ and $A_1$ and to changes in income. Balopoulos does both and shows that $\Delta E$ from 1955 to 1959 was dominated by the effect of income change, although changes in the tax structure were also important in explaining $\Delta E$. He also demonstrates the forecasting superiority of his technique when compared to less sophisticated tax functions (an average forecasting error of about 1.5 per cent). In short, his discussion of the personal income tax function is a distinct contribution; it provides a general methodology for use in developing personal tax functions grounded in the institutional setting that defines them.

Balopoulos' special attention to consumption theory is prompted by the argument (pp. 42–43) that existing models do not adequately account for the discriminatory effects of fiscal policy on consumption because of the aggregation problem. The several instruments of fiscal policy affect the distribution of (after-tax) income among consumers differently, so that models which concentrate on the *aggregate* tax liability and its effect on disposable income miss such discriminatory effects as occur through income redistribution. He thus sets out, in the context of the "permanent income" and "wealth" approaches to consumption theory, to formulate a consumption function that explicitly incorporates the fiscal instruments themselves, instead of the aggregate tax liability. Starting with the general form of the permanent income hypothesis for the individual consumers $c_t = f(i_t, w_t, v_t, y_t^d, c_{t-1})$, and assuming $w_t$ and $v_t$ can be expressed as functions of $y_t^d$ or $c_{t-1}$, the individual consumption function may be written $c_t = f_1(i_t, y_t^d, c_{t-1})$, and Balopoulos assumes the specific form

$$c_t = A_0 (y_t^d)^{A_1} (c_{t-1})^{A_2} (i_t)^{A_3}.$$

Aggregate consumption is then

$$C_t = N_t A_0'{}^{A_3} i_t^{A_3} \int_0^\infty \int_0^\infty (y_t^d)^{A_1} (c_{t-1})^{A_2} P(y_t^d, c_{t-1}) dc_{t-1} dy_t^d,$$

where $P(y_t^d, c_{t-1})$ stands for the joint probability density function of consumer units with respect to $y_t^d$ and $c_{t-1}$. Assuming the distribution of consumer units with respect to $y_t^d$ and $c_{t-1}$ are independent, and that the distribution of consumer units with respect to $c_{t-1}$ (*but not* $y_t^d$) remains stable over time, the aggregate consumption function becomes

$$C_t = A i_t^{A_3} C_{t-1}^{A_2} \sum_{i=1}^m (\bar y_{it}^d)^{A_1} v_{it},$$

where the summation part of the expression is an approximation to

$$\int_0^\infty (y_t^d)^{A_1} P(y_t^d) dy_t^d,$$

where $v_1$ denotes the number of consumers with mean disposable income $\bar y_i^d$ (also in the derivation $N_t A_0'{}_0 i_t^{A_3} (\bar c_{t-1})^{A_2}$ is set equal to $A i_t^{A_3} C_{t-1}^{A_2}$). By defining the relation between personal factor income, disposable income, and the provisions of the tax law for each consumer group, the derivative of $\bar y_i^d$ with respect to $\bar y_i^f$ and the various fiscal parameters is obtained, *and with the further assumption that the distribution of consumer units with respect to factor (before tax) income is unchanged* and linearizing the equation around the values of $C$ and $Y$ in one period, an aggregate function for $dC$ can be written in terms of the derivatives of aggregate factor income $dY^f$ and the various parameters set out in the tax laws (exemptions, rates, etc.). This is used in the aggregate models later on.

It is refreshing to see the problem of aggregating over consumer units tackled straightforwardly for a change—at least this once the "bag of worms" behind the phrase "no distribution effects" is opened. It may be questioned, though, whether the results are yet theoretically satisfactory. Specifically, the assumptions that the distribution of consumer units with respect to $y_i^d$ and $c_{t-1}$ are independent and that the distribution of consumer units with respect to $c_{t-1}$ is stable over time both seem rather strong assumptions. How can one posit individual consumption functions dependent on $y^d$ and also allow the distribution of consumer units with respect to $y^d$ to change, and simultaneously assume their distribution with respect to $c$ does not change? Also, it is not as innocuous as it may seem to assume that fiscal actions such as tax law changes alter the distribution of consumers with respect to *after-tax* but not *before-tax* income. While the evidence is unclear on how taxes affect behavior, some evidence (such as the distribution of state-local bond holdings in the United States by income class) suggests tax changes may very strongly affect the composition and amount of before-tax incomes of individual consumers. While these points are relevant, they should not obscure Balopoulos' contribution in facing an issue too long buried; they only suggest that the first efforts to handle difficult analytical problems are the easiest to criticize.

After discussion of corporate taxes and "other" taxes (expenditure taxes, death duties, national insurance and health contributions, and others) and estimation (simple least squares) of tax functions for each (the "other" taxes involve estimation of the tax yield functions for five excise taxes, local authorities taxes, death duties, the expenditure tax, and "remaining revenues," or ten tax functions in all), Balopoulos develops and estimates, using 1949–60 annual data, a 28-equation model. It incorporates 15 fiscal policy equations (five equations for excise and expenditure tax *bases*, five tax function equations, and five definitional equations relating to taxes) along with behavioral equations for employment, consumer prices, wage rate, the price of tobacco, gross corporate profits, distributed profits, depreciation, personal factor income, unemployment benefits, consumption, and definitional equations for unemployment, net profits, and undistributed profits. The predetermined variables include 23 instruments of fiscal policy (allowance rates, income tax rates, excise tax rates, purchase tax rate, average national insurance contributions, average unemployment benefits, profits tax rates, public authorities grants, and initial and investment allowances on new industrial buildings, plant, and equipment). Obtaining the reduced form by linearizing the structural form around the point defined by the values of the variables in 1960, he then uses it to measure the built-in flexibility of the British tax system—the reduced form matrix yields values of $\Delta T / \Delta Y$ for each tax (or group of taxes), for the short run, and substitution of stationary equilibrium conditions in the equations with lagged values yields long-run values of $\Delta T / \Delta Y$. He finds a short-run elasticity with respect to money income of 1.08 and a long-run elasticity of 1.16. With respect to individual types of taxes, the personal and corporate income taxes show high elasticity values with respect to $Y$ (2.02), while those for nonincome taxation are relatively low (0.63).

The real harvest of Balopoulos' work on tax functions lies in Chapters 6–8. Chapter 6 changes the model to make GNP endogenous. Equations are added for the GNP identity, gross private investment, inventory change imports of goods and services, the production function, the budget identity and a few others. The previous equations relating to profits are dropped, and corporate taxes are made exogenous and assumed not to affect gross private investment, and the excise taxes are combined into an exogenous variable. The result is a model with 25 endogenous variables and equations, 15 predetermined variables, and 14 fiscal instruments (4 income tax rates, 3 NI contribution rates, 1 NI benefit rate, and index of investments and initial allowances, and 6 expenditure variables). Again the reduced form is obtained by linearizing the model at the point defined by the 1960 values of the variables so the coefficients of the endogenous variables with respect to the predetermined variables are to be interpreted as strictly short-run, or "impact" coefficients.

Using the reduced form of the model, Balopoulos investigates the potency of the fiscal instruments in terms of their relative effects on output, prices, consumption, the external trade balance and other endogenous variables. A major finding is that direct taxation in the United Kingdom affects consumption more than expenditure taxation does, contrary to the usual a priori conclusion in the public finance literature. This reflects the tendency to ignore the foreign trade repercussions of the price changes induced by indirect taxation, which increases the impact leakage. He also finds (not so surprisingly in this case) widely varying effects on consumption of the various fiscal instruments—the most powerful instruments in terms of GNP effects are subsidies, exogenous taxes, and government purchases on current account—and that the revenue instruments have a smaller impact per dollar change.

The forecasting performance of the model stands up well for two years within the sample period, 1959 and 1960, but it does poorly in the case of 1958 and for one year (1961) outside the sample period. Balopoulos attributes the bad forecasts for 1958 and 1961 to the fact that monetary policy played a particularly strong role in influencing the values of changes in the endogenous variables in these years, and such influences (particularly on inventories, investments, and consumption) are not embodied in the structure of the model (the rate of interest which appeared in the consumption function earlier is deleted). This suggests perhaps the most significant criticism of his work, namely, that *had* the financial sector been incorporated in the model, the reduced form coefficients may have been different, and if substantial these differences may have modified or reversed some of his conclusions about the effect of changes in the fiscal instruments. Thus the validity of the qualitative and quantitative results of his model must be viewed with considerable uncertainty.

Following the principle of "effective market classification," Balopoulos finds that the fiscal instruments reduce to a group of five, where within each group the effect of each instrument on the values of the target values is similar whereas the impact coefficients differ between groups. It is thus

possible for fiscal policy alone to achieve "target" values of five endogenous variables, depending on the difference between the impact of the fiscal co-efficients in each group on each target variable and on the boundary condition imposed on the fiscal instruments. Balopoulos defines six such target variables and alternative desired values for them for 1961, and chooses six fiscal instruments with their boundary conditions.[1] He finds that fiscal policy alone could not have achieved the "best" combination of the target variables, but could have been used to achieve more modest objectives. A comparison of the implied change in the six fiscal instruments for achieving the modest objectives (large increases in government purchases, personal taxes, initial and investment allowances and public investment outlays together with large cuts in expenditure taxes and subsidies) with those actually employed leads Balopoulos to conclude that fiscal policy was misdirected in the United Kingdom in 1961 (personal taxes were reduced rather than increased, expenditure taxation was increased rather than reduced, and subsidies were relatively stable).

A summary of the results that Balopoulos generates with his model could be extended much further, but the examples mentioned already are sufficient to indicate the extensive scope of the application of the model to interesting issues. The book is worth reading for technique alone, as I have indicated. Whether his model provides a guide to qualitative and quantitative formulation of fiscal policy in the United Kingdom (after modification for the recent substantial modifications in the tax system in the United Kingdom) in light of the omission of a monetary sector and any effects of corporate taxes and the approximation introduced by linearizing his equations around variable values for one year is dubious. But econometric models are made to improve upon.

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*Modern Public Finance.* By BERNHARD P. HERBER. Homewood, Ill.: Richard D. Irwin, Inc., 1967. Pp. xvi, 535. Text edition, $8.95.

Professor Herber's textbook, *Modern Public Finance,* has a total of 535 pages, less than the number of pages of some other widely used U.S. textbooks on "Public Finance." The author deals with a variety of subjects including theoretical problems as well as institutional facts. To give the book structure and to enhance its pedagogical usefulness he has divided it into several parts.

The first, entitled "The Public Sector and Economic Welfare" (91 pp.), deals with theoretical aspects of the public sector and its raison d'être in a market economy. The second part (87 pp.) examines institutional arrangements in

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[1] The target variables really reduced to five, since achieving the desired proportion of investment to GNP implies achieving the desired ratio of public to private investment (40 per cent). Hence a solution is still theoretically possible using five fiscal instruments—one from each group. However, Balopoulos chooses fiscal instruments from only four groups, which violates the principle of "effective market classification." No reason is given for this, nor is an attempt made to employ instruments from the five groups with five target variables, which would seem to have been the proper procedure.

the public sector, expenditure trends and different hypotheses concerning the growing activity of the state, and intergovernmental fiscal relationships. Part III (159 pp.) deals wih various types of American taxes. The last two parts (180 pp.) are concerned with the role of fiscal policy in: economic stabilization and growth, elimination of poverty, urban and regional development, and national defense. The first part of the book and two or three chapters of the ensuing parts are predominantly theoretical; the rest is institutional and descriptive.

The author states in the preface that he wishes to stress recent developments in the theory of public finance and changes in thinking about the public sector's role in a market economy. The new feature is thus the adoption of the "multiple budget theory," developed in Musgrave's work, as a basic conceptual framework of analysis. As is well known, this approach distinguishes several "branches" of public finance, each dealing with a specific economic problem. Conceptually, there is the classical resource allocation branch, the income distribution branch, and the stabilization and economic growth branch. The conceptual framework constitutes a breakaway from the traditional notion that public finance is nothing more than a revenue-expenditure process. The new approach greatly helps us to "examine very carefully the divergences of substance that underlie similarities in money forms" as Professor Pigou once put it.

How well does the author succeed in expounding and integrating this new approach? He discusses the functions of each of the budget branches. For a thorough understanding of these, however, it is necessary to specify the lines along which the economy is working. Is it a Walras-Pareto type economy in which the public sector is an undesired necessity, is it a Keynesian type economy with unemployment, structural rigidities and intolerable social hardships which public policy is supposed to alleviate, or is it an in-between type with unemployment and simultaneous inflation? What type of fiscal tools are to be used or, in terms of the multiple budget theory, what branch activity should be stepped up depends very much on the nature of the economic system. Unfortunately the book is not too clear on this. The author enumerates the various branches of public finance but he fails to show that conceptually these branch activities are interdependent and should be reflected in simultaneously determined sub-budgets, the consolidation of which results in the actually observed budget. This is not brought into sharp focus and is bound to leave students somewhat bewildered and lost. The theoretical part of the book lacks conciseness and tightness. Part of this is, no doubt, the result of the absence of mathematical formulations.

The descriptive parts of the book contain almost the same information as other standard textbooks. There are detailed historical and legal accounts, supplemented by up-to-date statistics of important taxes in the U.S. tax structure. Taxes are evaluated according to traditional "fiscal rationality" criteria such as neutrality and revenue productivity. A paragraph is devoted to the problem of tax shifting which is analyzed in *ceteris paribus* partial equilibrium terms. A short section discusses the problem of unrealized gains and tax shifting. There are, however, no data on the incidence of the total tax structure. The aggregate

distribution of benefits from public expenditures and total budget incidence are not considered.

The author tries to start with a clearcut theoretical framework. Unfortunately, as he proceeds, more and more of it gets lost. This being the case, it is difficult to understand from this book what fiscal policy can actually achieve, given the multiple targets and constraints which exist. Still, the author should be given credit for having made an effort in the right direction. If he has not succeeded, he has nevertheless shown the type that future textbooks in public finance will be.

The book should be useful for undergraduate students. For graduate students it is, in the opinion of this reviewer, not recommended.

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## International Economics

*Maintaining and Restoring Balance in International Payments.* By WILLIAM FELLNER, FRITZ MACHLUP, ROBERT TRIFFIN AND OTHERS. Princeton: Princeton University Press, 1966. Pp. ix, 259. $6.50.

*International Payments, Debts, and Gold.* Collective essays by FRITZ MACHLUP. New York: Charles Scribner's Sons, 1964. Pp. viii, 472. $7.95.

In the history of economics, the Hegelian rule is often transgressed: synthesis fissions into thesis and antithesis. A period characterized by general doctrinal agreement is brought to an end in sharp controversy. The contents (or most of them) of both these decidedly interesting books, insofar as they describe the present state of professional opinion on balance of payments problems, disclose a basic consensus. (But at least two of their chapters suggest that serious disagreement lies just below the surface.) The balance of payments is not only a measure that can be unambiguously estimated, but it is a meaningful one in the sense that any significant departure from "balance" signifies a state of disequilibrium. Economies, of course, abhor a disequilibrium and once such a condition arises, measures to erase it must be set afoot. From this springboard a host of questions arises. How can the severity of the problem be recognized? Are there diagnostic aids that could help us to anticipate the problem? What kind of measures for its relief are optimal? What about the responsibilities of deficit countries? Of surplus countries? What adverse side effects can be anticipated? And how can they be minimized? Is a conflict between a country's balance of payments objectives and its other economic goals likely? How can the danger of such a conflict be averted? Are autonomous capital exports (or reparations) disequilibrating? These, and problems like them, are the common concern of those who work in this field. And most of the chapters in the books under review deal ably with them.

Selecting a few for special comment from the articles they contain is not easy, partly because they overlap to a considerable degree—it is not difficult to detect in 13 of the 14 authors the desires to reach consensus—and partly be-

cause each of the authors writes with authority on his topic. Here are a few that impressed the reviewer: dealing first with the joint product of the fourteen, Machlup has an exhaustive account of the problems of diagnosis—how can we recognize a balance of payments problem and its causes? Triffin, covering some of the same ground, presents a rather optimistic statement for expecting a convergence of objectives—although he is fully aware of the difficulties of securing a coordination of policies on an international basis. Harry Johnson sets out a short but revealing analysis of the possibility that countries will adopt mutually frustrating policies when each of them has at its disposal as many instruments of policy as it has objectives; the danger is real and the process of formulating policies can lead to a divergence from, rather than a convergence towards, mutuality. F. Lutz points out that in a world in which inflationary pressures are not everywhere the same, international capital movements may be perverse in the sense that capital may flow from high-yield to low-yield economies; there are of course more than enough other reasons for expecting such a result. Tobin has a neat statement bearing on the responsibilities for adopting equilibrating measures of countries in different categories (deficit, inflationary with moderate unemployment; deficit, no significant inflation and low unemployment; and sixteen more). He too points out that incompatibilities can exist; for their resolution either the liberal use of owned reserves or exchange-rate adjustment may be needed. And Scitovsky argues persuasively for the desirability on certain occasions of direct controls, cooperatively established, as being less costly than some of the more academically acceptable alternatives. This catalogue offers no more than a small sample; the volume is highly recommended.

Machlup's own volume is in many ways even more interesting. It contains some papers which deservedly have become "classics"; his reconciliation of the absorption and elasticities approaches to devaluation, his proposal to reduce the price of gold, his detailed account of plans for reform of the international monetary system, and several of his writings on the transfer problem. One is struck by the change in tone—perhaps not so surprising when it is recalled that the earliest contribution is dated 1928—and by the author's readiness to accept new ideas; one is also struck, as with everything he writes, by the precision, patience, and explanatory power of his writing. It is easy to believe that there would have been far less of the controversy that has its source in misunderstanding if only the distinctions and usages he has hammered out over the last forty years had been more widely recognized. The volume is highly interesting as a capsule history of doctrine for two generations and it will be very useful in instruction.

Despite minor differences there is something like a consensus in these volumes. (This is not altogether surprising since a sincere attempt was made by those who participated in the discussion that led up to the first volume to underline their common ground. Undoubtedly such an attempt brings gains in terms of influencing policy, though it can make for repetition.) But each collection contains one article which goes far beyond the others; an outsider which threatens the overly peaceful scene, but which it seems had no impact

on the other writers. Machlup in his own collection begins the process. His "Mysterious Numbers Game of Balance-of-Payments Statistics," unpublished until now, was set out as a lecture in 1962. In it he raises serious questions as to what a balance of payments statement really means. His answer is that, no matter how it is arranged, it sometimes can tell us almost nothing, and often that it can only tell us what we "know" on the basis of our theory. His description of what happened to the U.S. "Surplus" for 1951 (first estimated at $5 billion), as the measure was modified over and over again (when in 1958 it became a deficit of nearly $1 billion), is vivid, amusing, and sobering. What is especially troubling about the account is not so much that the statistical measure is slippery, but that the whole notion of a disequilibrium in the balance of payments is highly arbitrary and often based upon sloppy theory.

When, for instance, it is believed that U.S. dollars are in excess supply—evidence: "The monetary authorities had to absorb these dollars, and some of the abundant dollar reserves were converted into gold" (but is this really evidence at all?)—a state of deficit is proclaimed and the accounts are made to show it. His article makes one wonder about the relevance of much of the discussion of ways in which a payment's unbalance can be detected and of measures for retrieving balance. Even Professor Machlup in his 1966 paper seems to have forgotten his own lesson.

The second paper that cuts new ground is Walter Salant's "Capital Markets and the Balance of Payments of a Financial Center." It is impossible to summarize the whole argument here, but one of its implications must be stressed: with present international monetary arrangements (and even with the new SDR's) a continuation of international intermediary services necessitates a change in "the present notions of monetary authority and most economists about what constitutes 'equilibrium' in international payments." These ideas were evidently discussed amongst the whole group (the fourteen authors plus), beginning as early as autumn of 1963. But there is not the slightest hint in any of the other papers that maybe economists ought to look a little more carefully at the whole notion of international payment's disequilibrium before rushing off to battle to restrain it. A fission of the synthesis may nevertheless be beginning.

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*Trade and Trade Policy for Development.* By STAFFAN BURENSTAM LINDER. New York and London: F. A. Praeger, 1967. Pp. xi, 179. $6.00.

This book represents an important and original contribution to economic theory of trade and development. Weighty economic arguments have been developed in various quarters in the past to the effect that the traditional trade theory with its "free trade" policy prescription is not applicable to underdeveloped countries. In his new book, Professor Linder rightly claims that he has given to these arguments the benefit of more rigorous theoretical reasoning, bringing greater order into the confused discussion and providing a more systematic basis for formulating trade policies. The reviewer's task has not been

made easier by the fact that he is in basic agreement with the author's main contention.

To the writer of the present review, there are two main points of view from which the traditional trade theory has generally been subjected to critical examination. The one is consideration of dynamic economics, as against the admittedly static nature of the conventional theory. The other is the recognition of deficient adjustments through the working of the price mechanism, leading to the concept of structural disequilibrium. Linder also erects his theoretical edifice on both these cornerstones: "The conventional analysis of the welfare and structural effects of international trade is limited to the effects of reallocation of fully employed resources" (p. 10), but with respect to the effects of trade on underdeveloped countries, "the crucial question is whether the economic potential can be fully utilized at the same time that external equilibrium is maintained" (p. 3). In what represents Linder's positive contribution to trade theory, however, emphasis is rather on the second point of view; formulation of a really dynamic theory of trade and development still remains to be undertaken.

It is not a generalized dynamic theory of trade for development that emerges from Linder's painstaking efforts at systematization. In terms of the threefold classification of countries—advanced countries, developing countries with a foreign-exchange gap, and backward countries—it is mainly with respect to the special conditions of the second category of developing countries that the author explicitly denies the validity of the conventional theory. That theory he regards as applicable not only to advanced countries, but also generally to the trade relations of more advanced countries vis-à-vis less advanced countries or to trade among countries at the same level of development. Even in the case of developing countries, Linder argues, the application of the conventional theory is appropriate where suboptimal expenditure policies of developing countries aggravate their balance-of-payments problems or where certain efficiency criteria have to be satisfied in the process of import substitution and export promotion (pp. 151-52). Unless obvious statements about certain technical relationships are understood under the term conventional theory, it will not be easy to reconcile this conclusion with the main body of Linder's theoretical framework. It is also doubtful whether, as Linder maintains, the neo-classical theory is needed to explain the rationale of customs union among developing countries (p. 139). It is not paradoxical that the writers who reject neoclassical trade and customs-union theory advocate integration among underdeveloped countries.

In Linder's theory, the concept of foreign-exchange gap, which is defined under the assumption of "the pursuance of optimum expenditure policies and commercial policies formulated on the basis of conventional trade theory" (p. 43), is of central importance. The emergence of such a gap is explained, first, by the existence of certain minimum import requirements arising out of limited substitutability between domestic factors and the input imports. When the required minimum amount of input imports is not secured, there will be internal disequilibrium in the sense of frustrated savings and underutilization of domestic factors. Secondly, however, there is a ceiling of export earnings ("ex-

port maximum") which may fall short of the minimum import requirements, giving rise to a structural foreign-exchange gap.

The existence of a foreign-exchange gap is thus explained by reference to structural contraints on the process of economic adjustment and, in its turn, "means that the balance-of-payments adjustment measures do not have the same efficiency as when they are applied in advanced countries" (p. 46). Such a gap "does not imply overabsorption of goods and services in the ordinary sense. No matter how much the absorption is reduced, the deficit cannot be removed without substituting internal disequilibrium for external" (p. 51). Here we have one of the most radical versions of "structuralist" interpretation of balance-of-payments disequilibrium, which deserves further systematization in the form of a theory. In this interpretation, however, it would be rather difficult to maintain, as Linder does, that the traditional theory is valid in respect of the optimal expenditure policies that developing countries should follow. It is rather in connection with the discussion of the various possible effects of import controls on savings and investment that the author develops an extremely effective set of instruments of dynamic analysis of expenditure flow (pp. 85-88), which goes very much beyond the static confine of the "partial equilibrium approach" of the traditional theory.

The recognition of the structural nature of the foreign-exchange gap, however, should have enabled the author to see the possibility that the foreign-exchange gap in his sense can coexist with, and in fact be simply the reverse side of, the general-resources gap, including the domestic savings-investment gap. Unfortunately, Linder tends to portray the situations characterized by the respective gaps in such a mutually exclusive light as to deny the shortage of domestic savings in the context of developing countries where a foreign-exchange gap prevails. It is interesting to note that this partial nature of Linder's theory seems to lead to the conclusion that foreign borrowing should be limited to the foreign exchange components of the investment only (p. 117), at a time when even IBRD has begun to realize the folly of such a limitation.

Starting from the prevalence of a foreign-exchange gap, Linder comes to the conclusion that protection and control, even a selective one, to cure such a gap are justified because the purpose is to maximize imports of certain inputs within the scope of total imports (p. 86). While import controls would improve the balance of payments mainly through the production of import substitutes, successful import substitution must meet the efficiency criterion. However, the infant-industry case for protection requires only that the projects in question be net foreign-exchange savers, as against the traditional case in which the projects are required to become internationally competitive (p. 93). In view of the structural constraints on export expansion from developing countries, Linder postulates " a unilateral dismantling of trade barriers by the advanced countries as a less expensive form of aid to developing countries than other forms" (p. 103).

With regard to a customs union among developing countries, Linder's theoretical framework would suggest that trade diversion in Viner's sense is "nothing but the manifestation of the success of additional efficient import substitution and not detrimental" (p. 126). Economic integration, in fact, appears to

be the only possible trade strategy for developing countries in pursuing free trade among themselves and, at the same time, retaining whatever trade obstacles are deemed essential against advanced countries. This defense of discrimination in favor of one group of countries, combined with unilateral trade concessions on the part of other groups of countries, is very much in line with the position of the 77 developing countries so forcefully presented to the UNCTAD. Economists in their economic theory will be well advised to give full consideration to the theoretical justification of such policy demands.

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*Communist Trade with Developing Countries: 1955-65.* By CAROLE A. SAWYER. New York: F. A. Praeger, 1966. Pp. x, 126. $10.00.

*U.S. and U.S.S.R. Aid to Developing Countries: A Comparative Study of India, Turkey, and the U.A.R.* By LEO TANSKY. New York: F. A. Praeger, 1967. Pp. xvii, 192. $15.00.

*Soviet Foreign Aid.* By MARSHALL I. GOLDMAN. New York: F. A. Praeger, 1967. Pp. xiv, 265. $8.50.

After years of virtual neglect by Western economists, studies of the foreign economic relations of centrally planned economies have begun recently to reach boom proportions. And the Frederick A. Praeger Publishing Co. is apparently attempting to corner the market on those dealing with Western developing countries.

Carole Sawyer's monograph is a short, well executed and useful study. Her major contribution is to present the most important data on trade between the developing nations and the communist bloc and to draw from these data a number of conclusions that hitherto have unfortunately been neglected in the public discussion of these matters. Her unpretentious and straightforward analysis will be of considerable use, not only to economists but to the general public interested in these questions as well.

After some remarks on the Marxist doctrinal background for trade with developing nations, Dr. Sawyer presents a concise but thorough review of the volume and direction of trade from 1955 to 1965 between the communist countries and the developing nations, the balance of this trade, and its commodity pattern. Her data are drawn from trade sources of both groups of nations and are presented in a convenient manner to illustrate the most important trends. Her major conclusions center around the heavy geographical concentration of this trade in relatively few commodity categories. Of particular interest is her demonstration of the relatively unchanging commodity pattern of this trade over the entire period. From these commodity data and from information on trade and investment in the long-range plans of the communist nations, she draws a number of tentative and pessimistic predictions about the future trade volume.

In other chapters Dr. Sawyer contrasts the important relation between trade and foreign aid of the Soviet Union with the developing nations to the situation in the rest of the bloc where such a relation is quantitatively much less

important. From conflicting statements of various Communist political leaders about the future of this aid, she is able to underscore some of the policy dilemmas facing these aid givers. Again such topics are handled in a concise, authoritative manner.

The remainder of the book covers a variety of topics such as the economic rationale of this trade, problems arising from bilateralism, instability of trade, and re-exports. To such topics, which have been widely discussed by others, Dr. Sawyer adds little that is new. Indeed, she makes a number of quite questionable *obiter dicta* on the basis of very slim evidence. For instance, her remarks on Soviet bloc price discrimination against the developing nations might have been different if she had based her generalizations on a study of unit price trade data from the plentiful statistical materials of some of the developing nations.

In spite of other objections that can be raised against her conclusions, Dr. Sawyer's short but highly readable study fills a need in our knowledge and provides an excellent starting place for more detailed studies in the future.

Leo Tansky had the misfortune to write a monograph which costs almost twice as much and which contains only a small fraction of the materials in another book on the subject which is reviewed below. The core of Tansky's book is a set of case studies of U.S. foreign aid to Turkey and Indian and Soviet foreign aid to India and the U.A.R. Unfortunately, more than half of the 124 pages devoted to these case studies are taken up by thumbnail descriptions of the economies of the aid-receiving nations. Although he demonstrates that the two aid givers are trying to accomplish different aims in different ways, one is left wondering how general his conclusions are in regard to other aid-receiving nations. Furthermore, in his background information on the aid programs of the Soviet Union, he relies almost completely on materials drawn from secondary sources, so that few new insights are presented on the comparative differences in U.S. and Soviet aid programs. The author does raise a number of interesting questions about the relative economic impacts of the U.S. and U.S.S.R. aid programs on the aid-receiving nations, but the primary comparative purpose of the study is not very successfully realized.

Professor Goldman has written a remarkable book which will remain the standerd source on Soviet foreign aid for many years. He has drawn extensively not only from the economic and political literature of the nations receiving aid but also from a wide number of Soviet sources. In addition he has supplemented these sources with firsthand inspection of Soviet projects and extensive interviews with American and Soviet aid officials and with some high-level personnel in the aid-receiving nations.

The book begins with a review of Soviet economic relations with East European and Asian communist nations. On the debit side he covers the whole sordid story of reparations, juggled foreign-trade prices, and exploitative joint stock companies. On the credit side he examines various Soviet aid programs to these nations, particularly in their changing political context. These chapters, as well as all others in the book, are buttressed by many highly useful statistical tables and estimates.

Four case studies on Soviet aid to the U.A.R., India, Afganistan, and Indonesia follow. For the U.A.R. he presents some extremely valuable materials

on how the Soviets administer their various aid programs and the problems resulting from Egyptian difficulties in repaying. For India, the author makes a highly revealing comparative study of the Soviet steel mill at Bhilar, the U.K. steel mill at Durgapur, and the West German steel mill at Roukela, which highlights the different ways in which the three countries have tried to resolve various problems in these aid projects. For Afghanistan, Soviet successes are contrasted with American failures, particularly those that he traces to administrative inflexibilities. And for Indonesia, which provides a spectacular case of Soviet failures, his summary of mistakes and errors provides a useful guide to policies which aid givers must avoid.

The subsequent four chapters, each devoted to a particular area, outline in briefer fashion Soviet programs to other countries. The chapter on Asia details particularly the intense rivalry of Soviet and Chinese aid programs. The chapter on the Middle East presents some of the intricacies of using aid to influence domestic political events. The chapter devoted to Latin America demonstrates the pragmatic way in which the Soviets have dealt with this area. And the chapter on Africa focuses particularly on repayment problems and the difficulties of dealing with the touchy new nations.

Many of the successes of Soviet aid programs are due to a knack for selecting spectacular projects and maintaining the generated enthusiasm through skillful public relations work. In addition their workmanship on many projects is impressive and their training programs deserve, on the whole, praise. Goldman underlines the efficiency and flexibility of many of the Soviet administrative procedures and, in addition, he emphasizes their success in making neutralism a practical political alternative. The Soviet Union has not, however, been able to turn aid receivers into satellites, has disenchanted a number of nations, and has been plagued by some costly mistakes. Among the economic faults, Goldman feels that many projects are much too large for the market they must serve, while other projects have quite frivolous economic purposes (e.g., luxury hotels, stadiums, etc.).

Among the lessons for American policy makers, he continually emphasizes the need for a shelf of turn-key projects that can be quickly given to nations requesting factories producing particular goods. He further urges foreign aid for several "flagship projects" that will serve the same purpose for the United States as the Bhilar steel mill and the Aswan dam for the Soviet Union. He also has a number of suggestions to increase the flexibility of American aid administration.

The book has several shortcomings which deserve brief mention. Most of the evaluation of the economic impact of aid projects seems to be based on quite casual evidence. Of course, an adequate evaluation of such projects is extremely difficult, but the author gives little indication that he is aware of the many pitfalls. Further, although he presents a great deal of useful data on the types of projects and the industrial sectors to which such aid is given, at no time does he summarize these data for the entire Soviet aid program. On these matters the reader is left swimming in a sea of specific examples without any overall orientation. Finally, the many gems of observation scattered throughout

the book are nowhere drawn together in compact form. The concluding chapter focuses on only a few of the highly critical and relevant issues that are raised in this important book. But all of these are minor faults. Marshall Goldman's book is a far-ranging study which is an extremely valuable contribution to our understanding of not only Soviet foreign economic relations, but also of the various types of policy problems that accompany our own foreign aid program.

FREDERIC L. PRYOR

*Swarthmore College*

*Foreign Ownership of Canadian Industry.* By A. E. SAFARIAN. New York and Toronto: McGraw-Hill Company of Canada Ltd., 1966. Pp. xiv, 346. $8.95; paper, $3.95.

The growth of direct foreign investment by U.S. firms in recent years has raised many questions about the net economic impact of foreign-owned subsidiaries in the host country. In Europe particularly the "American economic invasion" has been widely criticized. Debate on this topic, however, rarely refers to the experience in Canada, where the concern about the dominance of U.S. firms antedates the present European interest by at least a decade.

Thanks to the painstaking work of Professor Safarian, we now have a much better basis for evaluating Canadian complaints about foreign subsidiaries there. The core of the study is the analysis of 280 usable questionnaires returned from about 1500 firms solicited in 1960. Although this is only about a 20 per cent return, the respondents represented some 40 per cent in nonresident owned petroleum and natural gas companies, and over 25 per cent in nonresident owned mining companies. This response rate was quite good, considering the length and complexity of the questionnaire, but one wonders with the author whether those who responded did so because they had a better story to tell than those who did not respond.

Although the study deals with all foreign ownership and control, U.S. ownership and control dominate. As of 1959, 52 per cent of the capital in petroleum and natural gas, mining and manufacturing was controlled by U.S. residents, and another 10 per cent by other nonresidents. This U.S. domination has been criticized because Canadians are discriminated against in appointments to senior management positions; exports are limited because the parent wants certain foreign markets to be served by itself directly or by its non-Canadian subsidiaries; research and development is not likely to be handled by the Canadian subsidiary, but rather by the parent; the Canadian subsidiary is biased in its purchasing toward the United States rather than toward Canadian firms; thus the development of the country's economy is hampered.

Safarian's study lends only moderate support to these charges. On balance, however, he finds that other factors, particularly those affecting Canadian costs of production, are much more significant in limiting economic growth. Thus market-sharing within the international firm does limit exports to some extent, but the inefficient structure of industry and the consequently higher unit costs

than in the United States are more to blame. Here the structure of tariffs is important, for

> ... tariffs and other restrictions on trade have given Canada both a good deal of foreign ownership and an industrial structure incapable of fully using the advantages of international business connections and of realizing the kind of performance demanded by Canadians. . . . Tariffs . . . play an important role in raising costs, in preserving an inefficient number of firms and products, and in limiting market horizons (p. 306).

Canadians have found it tempting to criticize in particular the larger firms, perhaps because they are more visible. The most interesting findings in this study, however, show rather clearly that the larger the Canadian subsidiary, the better the performance by Canadian standards. The large subsidiary is more likely to have Canadian nationals in senior management positions, to have research and development operations in Canada, to have a minority stock issue, to purchase a larger percentage of its inputs in Canada, to have more authority in decisions relative to the parent, and to have relatively low unit costs of production compared with those of the parent.

Safarian's study leads him to question, as have others, the wisdom of Canadian policies toward foreign owned and controlled firms. Besides general exhortation urging subsidiaries to make maximum use of Canadian personnel and facilities, the government has instituted differential taxation encouraging 25 per cent Canadian ownership and resident directors. The policy seems to be based on exaggerated views of the negative effect of foreign subsidiaries on Canadian economic growth. It also assumes, perhaps mistakenly, that 25 per cent local participation is going to affect the operations of the subsidiary significantly. And since the parent can deduct its Canadian taxes from its U.S. tax liability in any case, the tax incentive may be inoperative; the U.S. firm paying less in taxes to Canada will simply pay more to the United States. Finally, one can ask whether the Canadian capital which might be used to purchase the minority stock might be better routed into other ventures.

Safarian concludes that

> ... in significant part the direct investment firm has contributed to the development objectives favoured by governmental authorities in recent years. Where it has not done so there are often good economic reasons why it cannot perform as expected, reasons often related to the framework of public policy within which it operates (p. 311). . . . The international firm can be an invaluable ally in the process of restructuring Canadian industry . . . assuming Canadians are willing to make the changes in industrial policy which will take greater advantage of its particular capabilities (p. 312).

The needed redirection of Canadian policy toward the foreign firm should be accelerated by the findings of this significant study.

RICHARD H. HOLTON

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## Business Finance; Investment and Security Markets; Insurance

*The Retail Price Structure in American Life Insurance.* By JOSEPH M. BELTH. Indiana Business Report No. 40. Bloomington: Indiana University Bureau of Business Research, 1966. Pp. xix, 300.

This book reports the results of a study of life-insurance pricing which was commissioned by Consumers' Union. Therefore, it is concerned with the pricing of life insurance not from the actuary's viewpoint but from the policy holder's. Professor Belth demonstrates that the consumer cannot at present readily discover the true price of life-insurance protection, nor can the consumer make proper price comparisons between different kinds of policies, or between different companies. Though Belth shows that straight life is generally the "Best Buy," he finds so many differences between the prices of different companies, and notes so many possible differences among buyers, that in the end he feels unable to say anything very firm on the point. However, his study of markups, and of the effectiveness of price competition, is more conclusive. He finds that markups are so high and variable, and prices so variable between companies and so well concealed from buyers, that there cannot possibly at present be effective price competition in the life insurance industry. While recognizing that price is not everything, he thinks the present situation sufficiently bad to warrant compulsory publication of prices according to an agreed formula.

In his study Belth uses his own device, the level-price method, for calculating the price of protection to the policyholder. An appendix presents the computer program for this calculation. He convinces me that the traditional method which the life companies use is seriously misleading, and that the level-price method is better than most of the suggested alternatives. However, there is one oddity in his calculation. His method requires him to estimate "investment" in each policy year. He does this by adding the cash value of the policy to the net premium. While undoubtedly correct for the policy holder who already holds a policy, this does not seem to be the correct measure of "investment" for the prospective policy holder, who should presumably cumulate net premiums (premiums less dividends) from the beginning of the policy to the year in question, adjusting downwards to allow for the risk that he may not live to that year. If viewed from the standpoint of the present, this stream of net premiums should of course be discounted by an appropriate interest rate. Indeed, for the prospective policy holder the price of protection should surely be expressed by calculating the present values and costs associated with a policy. Belth recognizes that this calculation is possible and desirable, but for several reasons, not all convincing, does not adopt a present-value approach.

In exposition the book is clear and careful, assuming little prior specialized knowledge of the reader. It suffers somewhat from some unnecessary repetition, which Belth would doubtless have removed had he lived. Some readers will be more distressed by the total absence of any attempt at algebraic statement, summary, comparison, or generalization. All buyers should examine their

purchases with care: the review copy had blanks on every third and fourth page between pages 109 and 142.

IAN M. DRUMMOND

*University of Toronto*

## Business Organization; Managerial Economics; Marketing; Accounting

*The Foundations of Accounting Measurement.* By YUJI IJIRI. Englewood Cliffs: Prentice-Hall, 1967. Pp. xvi, 235. $6.95.

The steady drift of management from an art to a science has been highlighted by an increasing emphasis on the more sophisticated models of quantitative decision making. This emphasis has in turn prompted a close scrutiny into the accounting data that provide the basic inputs for the models of management science, and necessitated a clearer understanding of what accountants are doing and why, as well as what they ought to be doing. In this unique study, Yuji Ijiri explores the what and why rather than the ought, and does so in an interesting if somewhat tedious and labored fashion.

Ijiri attempts to assure that a background limited to high school algebra will enable one to read this book. The result is that far too much effort is wasted in talking down to the reader. Given that one is capable of something beyond a casual browsing through this volume, this treatment would not be warranted. In contrast, I suspect that the symbolically and logically complex first appendix on sets and relations (sans a single graphical illustration), and the mathematically sophisticated second appendix dealing with aggregation issues, will be ignored by the vast majority of readers, and understood and appreciated by a small minority of those who tackle either one. It is rather too much to ask the reader who stopped at high school algebra to understand generalized inverses and how to use them, without at least giving him some hint as to what a matrix is. My guess is that those who study the text will not be inclined to put equal effort into the appendices, while those who pore over the appendices will be bored by and wince at much of the text (Chapters 1 and 2, and the discussions of marginalism and utility being particular cases in point). Both text and appendix do, however, stand alone, and the text, to which the remaining discussion will be restricted, has much to offer.

The initial emphasis is on the notion that accounting is a system of communication in which symbols or surrogates are the products used to represent phenomena or principals. In particular, accounting is concerned with the assignment of numbers to objects—the question of measurement. It is, of course, possible to measure the same economic entity through different measures and the measurer and user of the measure may be different individuals. A single best measure is unlikely. The use to which the measure is to be put is the dominant issue, and since the underlying causal networks of interest commonly involve complex multivariate relations changing over time, criteria for choosing among measurement systems are required. Historical cost valuation leaps into

favor because of the stability and uniqueness of the underlying causal network. These properties are essential if we are to be able to predict and not be limited to description. To use this method of valuation, the resources controlled by an entity must be uniquely determined and quantifiable by an additive measure into a number of measurable classes, and changes in the resources must be identifiable as they take place. There are different recording systems and, as Ijiri stresses, despite the use of a single measure and double-entry bookkeeping, multiple measure systems will ordinarily be desirable.

Irrespective of the valuation method, accounting valuation is always a linear aggregation of quantities. The problem is to determine the weights, given that there will necessarily be some loss of information in the aggregation. This leads Ijiri to the aggregation effectiveness coefficient (i.e., the coefficient of multiple determination). He also suggests measures of objectivity of a measurement system (the second moment about a reference group's mean of a set of quantities), its reliability (the mean-squared error from an alleged "true" value), and its bias (reliability less objectivity). The latter relationship highlights the separation between the objectivity and use of a measure, as well as the dependence between its reliability and the use to which the measure is put.

Ijiri closes with an illuminating discussion of the decision process and how it relates to the accounting process. In particular, he points out that the factors that are recorded automatically attain greater distinction in decision making than those that are not. By determining how and what is recorded, accounting systems can influence the choice of goals as well as the alternatives considered. Finally, changes in accounting systems are important since surrogates might be perceived as they formerly were either because an individual does not or will not recognize the change, he has not been told of the change, or the effects of incorporating the change into the decision process appear to be inconsequential and not worth the bother.

This is a book that gets better as it goes along. Happily, it reaches a peak at the end. As an economist, I would have welcomed discussions of such topics as the importance and influence of accounting for tax versus book purposes, and depreciation versus user cost as interesting issues that would certainly have been more germane to the topic than most of the illustrations actually used. As a teacher, I would have welcomed a more readable book that could be recommended to a student without as many warnings, apologies, and qualifications. Nonetheless, as a frequent user and abuser of data (are there too many redundancies in this paragraph?) I welcomed the opportunity to study and reflect upon the issues raised in the book and would recommend that others falling into this category do likewise.

IRA HOROWITZ

*Indiana University*

*Price Policies and Marketing Management.* By ROBERT A. LYNN. Homewood, Ill.: Richard D. Irwin, Inc., 1967. Pp. xi, 331. Text edition, $7.50.

Dr. Lynn's book on pricing and marketing is admirable and is strongly recommended as an undergraduate textbook in marketing courses. It would also

be useful as supplementary reading for economics courses dealing with price theory. The reading of a policy-oriented book like this would serve as an antidote for some of the esoteric models in the puristic price theory.

The book is divided into four parts. Part I deals with theory. It covers the demand and the cost side, some price theory and price forecasting. The discussion on price theory is unfortunately nonrigorous and somewhat out of date. I believe that good textbooks should include a little more mathematical discussion even though some teachers may not want to use such material. The author does not define the elasticity coefficient as the *absolute value* of the result obtained by his formula and ends up suggesting, by oversight, that the elasticity coefficient of $-2.33$ is greater than 1. Game theory and econometric models are mentioned but there is no mention of input-output analysis as a forecasting tool. Special problems that arise in forecasting turning points of business cycles are also not mentioned, let alone treated. The author does not discuss recent advances in economics that deal with pricing of regulated industries. A term "full" economies of scale is used without defining it even in a footnote as the minimum long-run average cost.

Part II discusses policy aspects of pricing in terms of goals, market structures, product differentiation, discounts, price cuts, marketing channels, and special problems. The concept of basing point prices is well explained and, on the whole, this part makes good reading.

In Part III, which deals with pricing and the law, the author shows remarkable skill in explaining the legal intricacies without making the discussion drab. There is no reference to pricing in international markets and legal constraints associated with them. International operations also open some opportunities for tax savings etc., which are relevant. Considering that a number of U.S. corporations do have international operations, this is a shortcoming of the discussion. Price regulation and problems of public utilities are covered and the discussion suggests how to employ "creative" pricing in spite of several constraints.

Part IV gives a short summary of the conclusions. The book contains a few interesting cartoons and illustrations that should promote interest.

H. D. VINOD

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## Industrial Organization; Government and Business; Industry Studies

*Vertical Market Structures.* By H. H. BALIGH AND L. E. RICHARTZ. Boston: Allyn and Bacon, Inc., 1967. Pp. xii, 260. Text ed., $9.95.

This book has a good claim to rank as the most interesting and very possibly the most important contribution to the theory of markets that has appeared in the last ten years. Unfortunately, it is so lacking in literary and mathematical elegance and basic academic gamesmanship that its merits are likely to escape any casual examination. But on the two things that ought to

count most in original research—choice of subject and choice of method—the authors are almost wholly successful.

The authors begin by asserting that, while economists write at great length about competition between firms on the same level of production, they have little to say about cooperation between firms at different levels of production. This, of course, is not quite right. Older economists (e.g., Marshall in *Industry and Trade*, J. M. Clark in *Overhead Costs,* and C. I. Hardy in *Risk and Risk-Bearing*) had a great deal to say about vertical organization. And recent specialist work in industrial organization contains much that is relevant. Still, the authors' critical observation applies to the mainstream writing in economics of the last 40 years that has shaped the present content of basic theory courses. For this reason, Baligh and Richartz can be forgiven for quarrying virtually all of their building material from the recent professional literature of marketing and industrial management. It is refreshing to read a theory book that contains not a single reference to Hicks, Samuelson, Keynes, Robinson, or Chamberlin.

Essentially, this book is concerned with the phenomenon of the middleman —when he appears and when he does not. That is, given $m$ producers and $n$ consumers, what factors determine the number of "intermediaries" that will interpose themselves and the economic functions that they will perform. In the first and simplest model considered, it is assumed that the significant independent variable is a "contact cost" so that if the cost incurred by one buyer to contact one seller is one unit, total contact cost is $mn$. Should a first middleman emerge to perform the contact function, his total contact cost will be only $m + n$. Should a second middleman interpose himself between the first middleman and the $n$ consumers, his total contact cost will be $n + 1$; and the first middleman's total contact cost will fall to $m$. Therefore, once a cost function is specified for middlemen, it is possible to compute both the number of layers of middlemen and the number of middlemen per layer. It follows that when the marginal cost of contacting buyers and sellers is constant, and every middleman has a fixed cost, total contact cost in a system is at the minimum $m + n$ when a single middleman performs the entire contact function.

The authors then proceed to the case where (a) the demand generated by $n$ consumers is a random variable stationary over time, (b) $m$ producer must incur penalty costs whenever their current outputs do not exactly match current orders, and hence (c) each producer carries an inventory of finished product. Here they rigorously, if somewhat awkwardly, demonstrate that given plausible assumptions about wholesaling costs, the appearance of a middleman who undertakes to "guarantee delivery" on pain of paying a forfeit if he fails will allow the system to operate with lower inventory costs than would prevail in his absence. For since total demand for the product is a random variable, the fluctuation over time in the number of orders placed with a single middleman will be less than the fluctuation in the number of orders placed with the $i$th of $m$ producers (assuming orders to be randomly distributed among $m$ producers).

Finally, the authors take up the conceptually more difficult case in which the "product" does not appear in completed majesty from "inputs" after a

fixed period of production but rather passes through a finite number of marketable "forms." Here a programming problem exists. On the one hand, the inventory cost per unit of carrying a more fully formed product is greater than the analogous cost of carrying a less fully formed product. On the other hand, a unit of the less fully formed product remains for a longer time in the production pipeline. Here again, once the appropriate additional assumptions are made and the necessary equations stipulated, the equilibrium vertical market structure can be deduced. And provided as before that aggregate consumer demand is a random variable and orders are randomly distributed among producers, a part of the product-processing function will be shifted forward from $m$ primary producers to middlemen.

There are, of course, many important vertical market structures that are not treated in this study, most notably those forms which are related to oligopoly and oligopsony. But pure competition was surely the right place to begin. I would close with the Utopian hope that this book will become required reading for all policy makers who seek to do good by dictating the forms of vertical market structure. Commissars might be led to perceive the economic stupidity, as well as the wickedness, of shooting "profiteers" who deal in the products of socialized enterprises, and American trustbusters might begin to doubt the wisdom of preserving as many wholesalers and jobbers as possible.

DONALD DEWEY

*Columbia University*

*Control of Cartels and Monopolies: An International Comparison.* By CORWIN D. EDWARDS. Dobbs Ferry, N. Y.: Oceana Publications, 1967. Pp. viii, 380. $15.00.

Students of antitrust are aware that the approach to and philosophy underlying the enforcement of competition are different in the United States than in other countries. The precise nature and extent of the difference has not been well understood, however, particularly since the enactment by foreign countries in the last two decades of many new laws relating to cartels and monopolies. What was needed for such an understanding was a reasonably comprehensive account of the various laws and how they are being applied to the conduct of individual firms and to specific markets.

The publication in 1966 of Corwin Edwards' *Trade Regulation Overseas: The National Laws*[1] provided the information necessary for a comparison of the laws of ten Western European countries, New Zealand, Japan, and the Union of South Africa. The present book compares these laws as well as those of Finland, Israel, Spain, and Switzerland. Information about the laws of these four countries was not available to the author when his earlier book went to press and is now presented by him for the first time. This book also expands and brings up to date the study of the laws of the Common Market which was begun as part of an earlier study for the Department of State.[2] None of these

[1] Dobbs Ferry, N.Y., 1966.

[2] C. D. Edwards, *Cartelization of Western Europe,* Policy Research Study, Department of State, June 1964.

books deals with the laws of Latin American countries or of Australia.

Although the book consists in large part of an analysis and comparison *inter se* of the foreign laws and policies, the comparisons made between U.S. anti-trust policy and its foreign counterparts are of particular interest. The author finds significant differences in their purpose, content, and spirit, notwithstanding that their ultimate economic goals are similar. For instance, he notes that in other countries there is less inclination for government to depend upon competition as the primary means of achieving satisfactory performance of the economy; competition is favored more because it is likely to promote "fair" dealings than because it makes the economy self-operating; security as a goal has a higher priority than progress; there is less hostility toward concentrated power; there is more discretion given to officials, not only to apply the laws but to formulate policy objectives and substantive content. He also finds a greater disposition on the part of foreign governments to rely upon the decisions of private firms as to which business practices are in the public interest.

These differences, he thinks, reflect dissimilarities more in cultural inheritance than in economic structures, processes and interests. He recognizes that, with the exception of Japan, the countries that now seek to curb restrictive practices have a common cultural inheritance, but believes that in the United States, ideas inherited from Europe were deprived of much of their authority by revolution, by conquest of the frontier, and by the blending of immigrants whose national cultures were somewhat dissimilar.

The differences in content between U.S. and foreign laws are not as great as might be supposed from the foregoing. Even while recognizing, as the author does, the difficulty of generalizing about laws, it is possible to classify them according to whether they are more or less permissive than in the United States.

The foreign laws appear to be more permissive in two important respects. U.S. law is less tolerant of collaboration among competitors. The United States also makes monopolizing illegal, and in recent years has outlawed most horizontal mergers of competitors, whereas few other countries provide any curbs on mergers or on the acquisition or possession of monopoly power.

In most other respects, the foreign laws are equally, or less, permissive. Almost all the countries studied attempt to preserve opportunities for new enterprises and to prevent existing enterprises from being excluded from markets or from being subjected to discrimination; most of them regard unfavorably and seriously a powerful seller's refusal to deal with individual firms; about half of of them forbid or severely curtail resale price-fixing by individual sellers, whereas it is still permitted by agreement in many U.S. states; about one-third of them regulate or control in some manner the prices of powerful firms. It is well to keep in mind also that, in making comparisons, it is not enough to look only at the laws customarily thought of as antitrust. A substantial portion of the U.S. economy has been exempted from the antitrust laws and government regulations have been substituted for competition in some markets.

Part II of the book, comprising about a third of the main body of the text, deals with the experience with and the possibilities of collaboration among gov-

ernments in the control of cartels and monopolies. This part will be of interest primarily to those concerned with the application of cartel and monopoly law to the restrictive transactions of international business firms which take place in more than one country or which affect business carried on in other countries. Using this experience as a departure point, the author, in the last chapter, discusses instructively the possibilities and limitations of international collaboration in this field.

Corwin Edwards' ambitious efforts in the field of international antitrust have broken new ground and have made it possible to reach some tentative conclusions about the nature and significance of foreign legislation and how it compares with U.S. antitrust policy. Not only does his new book provide important insights and needed information, but it also suggests a number of avenues for further exploration.

SUMNER MARCUS

*University of Washington*


*Theory of Competition Policy.* By BASTIAAN DE GAAY FORTMAN. Amsterdam: North-Holland Publishing Co., 1966. Pp. 341. $11.20.

This book sets forth a rationale for a policy toward competition and private restriction thereof. Though it is intended as a work of general applicability, its preconceptions, emphases, and conclusions are characteristically Dutch. Indeed, it is a philosophical and theoretical statement of the ideas that underlie Dutch policy toward cartels and powerful firms.[1] In various respects, such as use of standards of performance, emphasis upon the importance of the business conscience, concern with conduct rather than power, tolerance for mergers, and objection to rules per se, its views resemble those of certain American critics of the antitrust laws; but these views are reached in a different way, and contain considerably more acceptance of the desirability of both restriction and private and public power.

An outstanding feature of the book is the breadth of the base upon which its ideas are built. To Fortman, policy toward competition cannot rest solely upon economic ideas nor be concerned solely with economic results. It must reconcile. considerations derived from economic theory, political philosophy, jurisprudence, sociology, ethics, and concern for administrative effectiveness. It should be coordinated not only with other types of economic policy, such as those applied to business cycles and the balance of payments, but also with other public policies, such as maintenance of domestic tranquility (which may require some respect for vested interests) and promotion of international peace (which may require support for vulnerable business in foreign countries). Public policy has multiple purposes. It should harmonize these purposes and pursue them simultaneously. This effort to conceive the policy problem in its entire social context is a refreshing contrast to the economically oriented single-string analyses of some American commentators on antitrust.

[1] The discussion of Dutch policy, however, criticizes it (pp. 284-85) on the grounds that there is too little resort to publicity about restrictions.

In Fortman's opinion, classical economic theory cannot define the appropriate contribution of competition to public policy for several reasons. This theory disregards the conditions conducive to growth, and is not concerned with noneconomic considerations. Moreover, it ignores economic developments that are important as a setting for policy, chiefly: (a) progressive enlargement of the economic functions of government; (b) management of the economy by large corporations; (c) modification of the profit motive by desire to safeguard the long-run future of the business enterprise; (d) lack of automaticity in the price mechanism's performance of coordinating functions; and (e) cyclical instabilities that involve recurrent dangers of cut-throat competition inconsistent with the public interest.

With classical theory thus set aside, Fortman wants competition, but not too much of it. To him competition is an essential attribute of a free enterprise economy, needed to assure freedom to do business, freedom of choice, and control of profit-seeking activity. Its principal function is to control the private use of economic power by exposing firms to the risk that bad performance may affect their future position. But for two reasons private restrictive behavior is not necessarily inconsistent with performance of such roles by competition. First, public purposes can be pursued not only by competition policy but also by other means. Public price policy, for example, should be a major instrument in controlling processes of production and consumption, and should be concerned not with the competitiveness of price making but with the level of the prices that are set. "It is doubtful . . . whether severely maintained competition policy could render public price control unnecessary" (p. 171). Second, competition is not uniformly desirable for all public purposes and under all circumstances. Instead, restrictions often (or perhaps generally) have a positive value, and "Even a price cartel combined with a detailed fixing of market shares . . . could be justified under certain specific [but unspecified] market conditions" (p. 97). The relevant question to Fortman is what private restrictions are acceptable and when.

Policy, therefore, should test restrictions by the standard of the public interest. This interest is conceived, not as the consumer's interest nor as the interest of the state nor as the highest common factor of all private interests, but as what is appropriate to enable members of a community to live together in peace and justice. Peace is served by competition that depersonalizes conflicts of interest, but not by competition that degenerates into warfare. Justice always demands protection of the weak, including small business as well as agriculture and labor, and requires an equitable consideration of the claims of all conflicting private interests.

By the standard of the public interest, Fortman finds some private restrictions generally desirable and some not. Private agreements are to him acceptable ways to coordinate economic activities and obtain the benefits of stability and planning. Since he regards cut-throat competition as a significant malady, he sees both price leadership and agreements for orderly marketing as useful safeguards. But firms should not "restrict competition so that they would not have to care if they performed badly" (p. 181). Freedom to compete should be preserved. Competition should be kept "open." Efforts to destroy competi-

tors should be prevented. Exclusive dealing that has "a permanent character" should be opposed except where there are special justifications. Boycotts should be regarded as suspect and should be appraised in the light of their purposes and methods. Private enforcement of private restrictions is not necessarily to be condemned, but should operate in accord with principles of justice.

Prepared to accept numerous private restrictions, Fortman is concerned with conduct, not with the possession of power. He considers that almost all firms have "some degree of control of the market," and therefore that the concept of monopoly "is not quite operational" and that "economic power should not be condemned as such" (p. 166). He makes no effort to distinguish undesirable degrees of power. Instead, because power may be the result of good performance, he thinks that firms should be allowed to grow by internal expansion. As a corollary, it would be "half-hearted" (p. 195) to prevent them from growing by merger, though mergers unrelated to performance may mean that competition is blocked and, if so, should be a matter for concern. But though attainment and possession of power are not objectionable, abuses of power should be prevented. Price policy should be used to control exploitative pricing, and competition policy should prevent powerful firms from impairing the openness of competition and thereby becoming indifferent to the quality of their own performance.

The kind of policy set forth above demands that those who apply it be capable of difficult substantive judgments, determining proper levels of prices, distinguishing restrictions that impair the openness of competition from those that merely coordinate activity or make markets orderly, and identifying abuses of power without challenging non-abusive possession of power. (Fortman thinks that similar judgments are involved in decisions whether or not to act under laws that ostensibly invoke simpler standards.) He recognizes that business enterprises may not perceive the considerations of public interest relevant to their conduct; and he thinks that the most important function of the state is to make these considerations clear to business in specific contexts. He is not troubled either by the difficulty of formulating such appraisals nor by the problem of making them persuasive to the business enterprises they affect. Recognizing that rules must be vague and official discretion large, he thinks that government should act only when the need to act is great (p. 219).

Publicity and persuasion are the preferred means of action. Public registration of restrictive agreements and preventive publicity by government against types of restriction thought to be intolerable are offered as ways of making business sensitive to the significance of restriction. Where the government thinks a restriction contrary to the public interest, the recommended procedure is careful formulation of the nature of the relevant public concern, resort to informal persuasion, and, if persuasion fails, use of orders that invalidate objectionable features of agreements or enjoin specified abuses of power. Further sanctions are thought proper only if the public interest has been made explicit and compliance with it cannot be otherwise obtained.

Fortman wants less competition than Americans think desirable and believes that less can be had than they think practicable. In both respects, the cleavage is clear, his principal points are set forth explicitly, and the issues are intelligi-

ble. But his conception of the relation of business to government is hard for an American to understand. Businessmen are regarded as willing not only to subject their private interests to the public interest but also to accept governmental leadership in determining the public interest, in spite of the complexity and admitted vagueness of the standards involved. Government officials are able not only to ascertain the public interest by such standards but to convey its meaning persuasively to businessmen whom their conclusions affect adversely. Though these officials possess vast discretion, they can be counted on to use it circumspectly and, in correcting private abuses, to abstain from public ones. Lord Acton would be astonished!

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*National Transportation Policy: Formation and Implementation.* By HUGH S. NORTON. Berkeley: McCutchan Publishing Corp., 1967. Pp. vi, 249. $8.50.

In contrast with Dearing and Owen's *National Transportation Policy* (Brookings, 1949), this book does not attempt comprehensive analysis of national transportation policy in terms of detailed analysis of particular problems, specification of sophisticated economic criteria for policy, and determination of the specific economic effects of past policies. Rather, the book is designed to review and discuss the historical processes by which national transportation policy has been formed.

The book is divided into three parts. Part I, comprised of seven chapters, discusses the historical relationship of national transportation policy to general economic policy; technological change as a primary factor in evolving policy for the promotion and regulation of transport; the assumptions and institutional forces in the evolution of federal promotional and regulatory policies for each mode; the current awareness of urban transport and its recent incorporation within federal transport policy; carrier labor problems and legislation as elements of national transportation policy; and the modern problem of adjusting the control of transport pricing in line with the requirements of market freedom for competitive pricing. This part is largely descriptive, pulling together in summary form the entire historical course of formation of public transportation policy, focusing attention on basic issues and stating the author's informed views on a number of critical issues.

Part II, consisting of five chapters, contains the most distinctive contributions of the book. Here the author undertakes interesting and useful historical analyses of the respective roles of the President, the Congress, the regulatory bodies (principally the ICC), the courts, and the trade associations in the formation of national transportation policy. The final two chapters in Part III give the author's summary evaluation of the entire process of forming national transportation policy and his outlook as to possibilities for improvements in policy, including through the new Department of Transportation established in 1966.

In general, the author's presentation of the historical and technological back-

ground of national transport policy and his concise summaries of specific legislation and policies appear well done to this reviewer. Norton can be commended for not attempting to rewrite the actual historical motivations for federal railroad regulation previous to 1920 as Gabriel Kolko, with unconvincing evidence, has attempted to do. On the other hand, Norton over-idealizes the Transportation Act of 1920 and the National Transportation Policy in the 1940 Act and understates the significance of the Motor Carrier Act of 1935 as the real break in the traditional philosophy of regulation. He errs in stating (p. 9) that no fears were expressed that motor carrier regulation would be dominated by a rail-minded ICC such as were expressed for airlines when their regulation was placed under the CAB instead of the ICC. The ICC's Bureau of Motor Carriers was organized in 1935 to assure motor carriers that regulation would not be rail-minded. Because it inaugurated entry controls for competitive industries and fair-sharing standards of minimum rate regulation, the Motor Carrier Act was more influential in bringing about regulation protective of regulated carriers than the Transportation Act of 1940 which merely incorporated the policies of the 1935 Act into the National Transportation Policy and added limited control of domestic water carriers. As recognized by Norton, the Transportation Act of 1958 changed the basic course of regulatory policy to the opposite direction, by rolling back moderately the protective regulation of the 1930s in favor of greater market freedom for competing modes. Norton almost totally neglects entry controls and their economic effects, and does not find "any general economic discussion since 1900 centering around the basic philosophy of regulating transportation." Overlooked was the NRPB's *Transportation and National Policy* (1942), particularly the two papers conceptually re-examining the role of regulation (pp. 197-249). However, Norton correctly observes that few people gave serious thought to regulatory philosophy.

In formation of national transportation policy, Norton assigns the key role to Congress and the next most influence to regulatory bodies, although the President, the courts, and the associations all exert influence. Among the Presidents, Wilson, Hoover, and F. D. Roosevelt, faced with critical transport problems, gave most attention to transport policy. But until the Department of Transportation was organized, Norton concludes that the President had limited opportunity to influence transport policy. In view of the pressures of vested interests on Congress and deeply imbedded promotional policies, Norton doubts that the DOT can achieve the substantial benefits that in theory might come from coordinated investments in public transport facilities. He appropriately criticizes the ICC for not doing more creative research toward the improvement in regulatory policy. In general, Norton emphasizes the complicated governmental processes in transport policy formation, citing as defects the fragmented responsibility of goverment agencies, the tendency of commissions to become advocates of regulated industries, and the lack of effectiveness of public opinion.

Throughout, Norton uses key, and even extensive, quotations from scholarly works and other sources on particular aspects of his subject. This method gives readers knowledge of the pith of the findings of many well-selected authorities without having to undertake vast reading in numerous sources. Norton has

contributed a useful monograph for those wishing to comprehend the processes through which national transportation policy is formed. It clearly lends realism to oversanguine expectations of reform, but does not positively indicate how needed improvements in transportation policy can be achieved.

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## Land Economics; Agricultural Economics; Economic Geography; Housing

*Pricing Efficiency in the Indian Wheat Market.* By RALPH W. CUMMINGS, JR. New Delhi: Impex India, 1967. Pp. 203. $3.75.

Development planners, in recent years, appear to be paying an increasing amount of attention to the patterns of marketing agricultural production while continuing their interest in the problems associated with increasing productivity. Recent symposiums held in the United States on the role of U.S. Agri-Business in development have been well attended by participants from the private as well as the government sector. These meetings have pointed to the need for not only a better understanding of how the marketing system functions in developing countries but also what measures should perhaps be considered by the governments of the third world if investment from the U.S. private sector is to be encouraged.

Here is a book that at once describes the workings of a particular market town in a wheat area of North India. It then goes further to spell out some of the limitations and restrictions which are imposed on the entire market system when the government intervenes and disrupts the normal trade patterns that can be expected as responses to the supply of and the demand for wheat in India. If policy makers are impressed with arguments put forth here for free trade in a specific commodity, they should be able to find analogous advantages to encouraging investment in the private sector with accompanying market freedom particularly for those inputs important in increasing agricultural productivity.

The objective of the book is "to examine the role of the price system in allocating resources for economic development." The writer also wanted to determine if the repeated attack on the performance of the private marketing system was warranted. He points out the importance of wheat in the Indian diet and states that his analysis does not lead to proof because of the dearth of available data but does allow him to draw some conclusions from what is available.

He is particularly concerned with the private wholesale market and states in Chapter 1, the "Introduction," that this market performs three major functions: it (1) procures wheat from agriculturists who grow the crop, (2) distributes wheat to consumers, and (3) provides a signal within the production period to be corrected by producers in the next period. In general this section gives a very good account of the role that markets and, in particular, prices play in a developing economy, and this section of the book should have particular appeal

to the general reader who wants to become more knowledgeable in this area.

In Chapter 2, "Market Environment for Wheat in India," he discusses cultivating conditions, production, variability in demand, patterns of marketing, and government participation in foodgrain trade and he concludes with a statement about the factors which can limit the matching of supply and demand in a free market. A section might have been included here on the changing expectations by farmers to prices received at harvest. It was thought in the past that farmers always expected post-harvest prices to follow the pattern established in previous years, but there now appears to be some evidence that in a rising price situation farmers expect higher prices after harvest than they did after the previous harvest. Additional information on this hypothesis would have added to the chapter.

Chapter 3, "Khanna Market, a Case Study," is an interesting analysis of a particular market situation and the roles that the different elements in the marketing system play. In addition to pointing out the relative efficiency of the traders in regulating the markets, the author mentions the relative unpopularity of marketing cooperatives. This is indicative of both the general distrust of government and its employees by farmers in India and also the farmers' disenchantment with this form of business organization.

In Chapter 4, "Pricing Efficiency of the Marketing System," he presents data for two time periods to test the interdependence of the interstate marketing system in attaining efficient pricing. One time period has unrestricted private wheat movements between states and the other has movement restricted by the government. On page 102 he indicates that imposed zones caused greater price instability and frequent changes in relative prices between markets from year to year as compared to the unzoned period. It is further related that States with the largest deficit showed the largest increase in prices.

Chapter 5, "Implications for Future Foodgrain Price Policy," has a fourfold purpose: (1) conclusions regarding the pricing efficiency of the private wheat trade compared to alternatives are presented, (2) performances of government foodgrain price policies are evaluated, (3) the role of economic incentives in increasing India's agricultural production is discussed, and (4) implications of this study for future foodgrain price policy are presented. This chapter is a good attempt to come to grips with some of the important policy problems in India. No one attempt at policy formulation has all the answers, but this is certainly a good starting point and it is better to ask for too much from planners than to seek only the minimum. Like the other chapters, this one is both well footnoted and documented.

The appendices range from a glossary through a calculation on the profitability of storage to a list of monthly wholesale wheat prices in 27 markets in India.

In general this book should appeal to four types of readers: (1) those interested in general development policy with particular interest in the role of the private sector; (2) those interested in Indian agricultural economic development; (3) students of agricultural price policy and its possible effect on development; and (4) investors who are interested in the actions which can be taken by policy planners within developing economics. The analytical approach

taken here was in keeping with the quality and quantity of the data available and should not discourage the general reader away from this book.

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*Soviet and East European Agriculture.* Edited by JERZY F. KARCZ. Berkeley and Los Angeles: University of California Press, 1967. Pp. xxv, 445. $10.00.

This volume presents a collection of papers on current problems of agriculture in the Soviet Union and Eastern Europe by a group of scholars representing several academic disciplines. The papers were originally delivered to the Conference on Soviet Agricultural and Peasant Affairs held at the University of California, Santa Barbara, during the summer of 1965.

This is the third recent collection of articles on Soviet agriculture, and it is much the best. (The others are *Soviet Agricultural and Peasant Affairs*, edited by Roy D. Laird, and *Soviet Agriculture: the Permanent Crisis*, edited by Laird and E. L. Crowley.) But, like many volumes of conference papers, the selections are still uneven in quality.

Economists contributed several empirical studies to the volume—Naum Jasny on costs and prices, Norton Dodge and Murray Feshbach on employment of women. Of the empirical studies, Nancy Nimitz' article on agricultural employment deserves note since both her estimates and her methodology are of considerable interest. An attempt by Harry Walters and Richard Judy to predict Soviet agricultural output in 1970 contains useful estimates of the gross output of grain during the 'fifties, but the reader may be inclined to agree with the authors when they write: "It may, indeed, seem ironic that at the very time when 'subjectivism' and 'hare-brained scheming' are being so strongly condemned in the Soviet Union we should undertake a project which ultimately involves large doses of both." Unfortunately, most of the economic contributions are primarily lists of statistics. There is little of general theoretical interest and the conclusions are often lost in a deluge of statistical minutiae. The authors, having gone deeply into the statistics of their subjects, tend never to come up again.

The book contains two excellent brief essays of general interest by Alec Nove and David Joravsky. Alec Nove discusses the relationship between the local officials and the peasants under collectivized agriculture. "Collectivization itself was a major surgical operation, which affected patients and surgeons deeply. Collectivization was not merely based on large-scale coercion, carried out by local officials, but also on a series of lies, or at best half-truths, concerning what was happening and why it was happening." The system of orders, coercion, and punishment that developed was a response to confiscatory prices and nonexistent or misleading incentives. "Substitution of commands for incentives also explains the tendency of some officials to resort to various forms of statistical manipulation, since their careers depend on claiming success in the fulfillment of basically unrealistic plans." The attitudes and behavior gen-

erated in the past, says Nove, are serious obstacles to future progress in agriculture.

In an article with the unpromising title of "Ideology and Progress in Crop Rotation," David Joravsky discusses the political factors that led to the triumph of pseudo-science over science in Soviet agricultural technology with the adoption of V. R. William's *travopol'e*, or grassland rotation system. Unwilling to blame the new socialized organization of agriculture for their difficulties in the 'thirties, Bolshevik officials blamed science, says Joravsky, and they closed the gap between science and agriculture by the severe retardation of science. "The relationship between Lysenkoism and Soviet agriculture seems obvious and simple. During the 'thirties and 'forties an agricultural policy based on intuition and bluster fostered an agrobiology based on intuition and bluster."

Contributions to the volume by geographers Robert Jensen, Jeremy Anderson, and Warren Hultquist give a single, overwhelming impression. This is an impression of incredible inefficiency in Soviet planning of technical matters related to cropping, regionalization, and location.

The bulk of the book is devoted to agriculture in the Soviet Union with the exception of articles on Yugoslav peasant attitudes by Joe Halpern, Czechoslavak agricultural productivity by Gregor Lazarcik, and Polish agriculture by Andrzej Korbonski. Korbonski's article raises particularly interesting questions. Although he finds that private farming in Poland did provide better incentives than collective farming, his discussion points up the fact that a private sector deprived of positive price incentives and lacking minimal elements of security will not be efficient or productive simply because it is private.

This book contains several useful articles. Its most serious lack, in my view, is the absense of any contributions by scholars from the countries being studied.

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*The Economics of Crude Petroleum Production.* By PAUL G. BRADLEY. Amsterdam: North-Holland Publishing Co., 1967. Pp. xiv, 149. $9.00.

"Oil has been called black gold, ammunition, and the blood of the Arab people," but that is not what this book is about. Nor is the author concerned with the many intricate factors affecting the price of petroleum—the large overheads and low variable costs, the dominating role of the seven (or should one by now say eight?) international oil companies, the pressures exerted by the producing governments, the integration of production, transport, refining and marketing, the problems posed by joint products, and so on. His task is more modest: "to define an acceptable measure of the cost of obtaining crude and to estimate incremental costs corresponding to different output levels in the important crude-exporting regions." In this he has been highly successful and the methods he has devised could probably be applied to other minerals.

Rightly rejecting the "replacement cost" used by the industry, Bradley states: "The required measure must reflect payments needed to secure the nec-

essary factors of production. It must be defined per barrel of oil, when produced, so that price comparisons are possible." Since royalties and other concession payments are, very properly, regarded as economic rents and not included in costs, production costs are reduced to two components, extraction and development costs. Extraction costs are calculated in a rough and ready way. U.S. experience shows that operating costs range from $6.50 to $13 per well-day and Canadian costs average $12. Assuming foreign costs to be $50 per well-day and output 500-5,000 barrels a day, operating costs would be 1-10 cents or, say, 5 cents per barrel.

Development costs are determined, for long periods, by the formula:

$$Z = \frac{I}{q_0}(D + r)$$

where $I$ is development investment, $r$ the discount rate, $q_0$ initial output, and $D$ the rate of decline of output. In applying the formula to the Middle East, Libya, and Venezuela, difficulties arise in obtaining the technical data necessary to calculate $D$, the rate of decline. Another difficulty is to secure meaningful and comparable figures on annual capital investment. Both are solved by elaborate models and regression analysis and yield results of about 12-22 cents per barrel in the Middle East and Libya, 40-45 in Venezuela, and over $1 in Nigeria for the period 1953-62. Adding extraction costs gives total costs of say 15-30 cents for the Middle East (compared to selling prices of over $1.25) and Libya and about 50 cents for Venezuela. Capital-output ratios (dollars per daily barrel) were about $200-400 in the Middle East and Libya, showing no tendency to rise, and $600-900 in Venezuela.

One can challenge several of the assumptions on which the calculations are based, but the findings seem reasonable and the figures are fairly close to those given in earlier studies.[1]

To forecast future costs, an attempt is made to determine probable reserves in various regions, according to the geological provinces in which they are located, by means of a distribution function. The general conclusion is that "it is very unlikely that per barrel costs in the Persian Gulf will rise signifiantly as new capacity is developed between now and the late 1970s. While the outlook for Venezuela is much less certain, it is quite possible that the present level of costs can be maintained there over a similar period." This would be cheering were it not for the fact that cost is just about the last factor that has been determining, or is likely to determine, the price of foreign oil.

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[1] C. Issawi and M. Yeganeh, *The Economics of Middle Eastern Oil*, New York 1962, Ch. 4.

*Monopolios contra paises pobres: la crisis mundial del estano*. By GUILLERMO BEDREGAL. Mexico: Siglo Veintuno Ed., 1967. Pp. 269.

The author of this book, Guillermo Bedregal, was for some years head of the Bolivian government tin mining firm, Compañia Minera de Bolivia. Since

the counterrevolution of November 1964, which threw out of power the party with which Sr. Bedregal was associated, he has continued to be concerned with the problems facing the tin industry, which provides most of his country's foreign exchange. The present volume is the result of a detailed investigation of the industry, not only in Bolivia, but worldwide.

The main theme of Bedregal's study is now a familiar one: the countries that are principally producers of a limited number of mineral or agricultural products which they export to the highly industrialized nations are being "exploited" by their customers. In the case of tin, Bedregal sees this situation as being intensified by the fact that the facilities for refining the mineral are to be found only in Great Britain and the United States.

The volume provides his readers with a country-by-country survey of the tin industry. Separate chapters are devoted to Bolivia, Congo, Malasia, Nigeria, Indonesia and Thailand. Another chapter sums up the situation of the industry in fourteen other nations.

Bedregal also goes into some detail concerning the prospects for the future of both production and consumption of tin, including the use of substitutes. The balance of his survey is the conclusion that the demand for the metal is likely to rise more rapidly than the supply, since no major sources of tin have been found in three decades, and the mineral being exploited is tending to have an increasingly smaller percentage of metal. The latter fact is leading to higher costs of production, and to the development of substitutes in the industrialized countries.

Understandably, Bedregal devotes special attention to the problem of tin in his own country, Bolivia. He suggests that the government of which he was a part, that of the Movimiento Nacionalista Revolucinario, which ruled from 1952 to 1964, made a fundamental error: It did not base its program of economic development on its mineral wealth. More specifically, only too late did it make the decision to establish a small tin refinery.

In addition to his emphasis on the "industrialization" of its mineral wealth, Bedregal suggests two other essential elements to a program for getting Bolivia out of its vicious circle of poverty. These are planning of the market for tin and other minerals that the country does or can produce, so as to bring about an equilibrium of supply and demand thus providing more favorable prices to Bolivia and other mineral producers; and the formation of a Latin American common market.

This volume is a valuable contribution to the study of the problems facing the developing countries, whose economies are excessively dependent on the willingness of the industrialized nations to buy their limited range of exports. Although many readers will not agree with all elements of Bedregal's analysis, or with his prescriptions for changing the situation of the countries he studies, they will certainly be provided with a great deal more information and informed analysis to serve as a basis for reaching their own conclusions.

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## Labor Economics

*Structural Unemployment and Aggregate Demand.* By ELEANOR G. GILPAT-
RICK. Baltimore: The Johns Hopkins Press, 1966. Pp. xiii, 235. $8.50.

How employable is the U.S. labor force? The question received widespread
ventilation both among economists and the general public in the early 1960s as
part of the controversies then raging about fiscal and monetary policy. It was
raised by those (of whom Chairman Martin of the Fed was the most promi-
nent) who did not believe that a more buoyant fiscal and monetary policy was
desirable despite unemployment rates of over six percent. At that time, ex-
tremists in the structural camp were saying that lowering unemployment
through lower taxes and easier money was not merely unwise, but that it was
downright impossible. The job openings were square holes, and the unemployed
round pegs. While the experience of the U.S. economy after the tax cut has
proven the more extreme structuralists to have been wrong, the nub of the ques-
tion the structuralists raised is legitimate. It deserves to be rephrased: taking
into consideration the characteristics of the U.S. labor force (and given also
the concern over balance of payments and price stability), what is an appro-
priate unemployment target for use in setting monetary and fiscal policy?

In the latter half of the 'sixties the focus of interest on questions about the
quality and composition of the labor force has shifted to the poverty issue. We
want to know how much of the poverty problem could be solved by measures
that would increase the earned income of those now poor and how much must
be left to be done by handouts of one kind or another.

Dr. Gilpatrick's book is a worthwhile addition to the literature in this field.
The book consists of a painstaking examination of a great deal of the published
data that bear on the questions of the composition of the demand for labor and
the ability of the labor force to meet those compositional demands. The impor-
tant prior literature in the field is also summarized and evaluated. Thus, the
book is a valuable reference.

The plan of the book is to look for clues to changes in the demands of em-
ployers for labor as to type, skill, education, region, and the like, and then to
gather clues as to whether the labor force has changed its composition in a way
that is consonant with employability, given the changing demand conditions. If
sweeping changes in quality demanded by employers can be shown, and if it
can also be shown that these changes have not been matched on the supply
side, then we may infer that a return to the golden age of the early 1950s,
when unemployment rates were 2-3 per cent, is impossible without a good deal
of direct effort to upgrade the labor force.

Dr. Gilpatrick first looks at the evidence for "structural" changes on the
side of the demand for labor. She considers the record of productivity growth,
by industry, as well as the behavior of capital-output ratios, and concludes that
there is evidence of bunched technological change. She finds an accelerated
shift from goods to services in the 1950s. She then follows with a chapter enti-
tled "Changes in Employment Requirements," which is in fact an examination
of shifts in the composition of actual employment. Employment figures are
sliced every way the data allow and evidence found of "marked shifts in the

occupational, locational, and industrial composition of employment in the post-war period" (p. 92). Shifts in skill proportion by industry are noted.

The author then turns to adjustments made by the labor force to changing employment requirements. An extensive consideration of the data on labor force participation leads to the conclusion that participation behavior was adaptive, but not adaptive enough. An attempt is made to demonstrate skill shortages by observing that 1951-53, 1959, and 1962 were years of falling labor force participation and unemployment rates for men, falling participation rates for women (except in those years where female employment rose), and demand at above-recession levels. No very compelling argument is given as to why such a constellation of events should signal skill shortages. Somewhat more persuasive is the observation that "entry jobs," defined for each occupation as increases in employment less net shifts from other occupations, are increasingly occupations requiring higher skills.

In the discussion of the educational upgrading of the labor force, data are presented showing that, between 1957 and 1962, the unemployed did not fall behind in schooling; quite on the contrary, in median school years completed the unemployed gained on the employed absolutely and relatively. The conclusion drawn from the study of educational adaptation is the correct one, that there have been increases in educational attainment and that these tend to be reflected in the requirements of employers, The author fails to note the corollary that, if this is all there is to it, then requirements could not possibly get ahead of attainments, and structural unemployment because of increasing educational requirements would not be possible. Instead, the section concludes with a discussion of the plight of the drop-outs as dramatized in the *Manpower Report(s) of the President*.

Data on migration, long-term unemployment, youth, Negroes, job vacancies, a superficial but well-merited attack on the Phillips curve and some worthwhile policy suggestions and remarks on data gaps round out the book.

For the most part the chosen statistical tool is the simple regression, with an interpretive look to see whether the time period can be split up and whether there are any big residuals to which revealing explanations can be attached. For example, to examine the economic responsiveness of migration, male migration rates are regressed against changes in male employment. For the period 1948-63 the correlation is nil. However, when the data are split at 1956, we find that migration and employment changes have a high positive correlation in the earlier period and a high negative correlation in the later period. Thus, migration in the earlier period is said to have responded to the pull of opportunity and in the later period to the push of hard times. "This could be the result of changes in the nature of skill availabilities or of changes in job availabilities or both . . . The reasons for the sharp behavioral shift are not absolutely clear but a structural shift in behavior seems to have occurred" (p. 134). In this, as in a number of other cases, the justification of the inference is unclear, and the contribution of the regression to prediction is not obvious.

What does it all add up to? The author's verdict, which seems reasonable on the basis of the assembled evidence, is that structural unemployment may have increased. It must be remarked, however, that those who draw this conclusion

should feel themselves under an obligation to tell us how bad or extensive the change has been, and this Dr. Gilpatrick does not do. She speaks of "marked" charges in the composition of the demand for labor. But how marked must a change be before it causes trouble? All of the thousands of numbers and dozens of regressions in the book do not add up to an estimate of how bad (or how much worse) matters are or have become.

The weakest aspect of the work is the failure to emphasize that, in the medium run, employers' requirements are unlikely to be independent of the quality of the labor force it seeks to hire. This failure leads Dr. Gilpatrick to quote with seeming approval an author with the apocalyptic vision of "the simultaneous threat of disastrous youth unemployment and critical manpower shortages" (p. 226). It also leads her into deducing higher skill requirements from the fact that employers have been able to hire more highly educated people and place them in increasing proportion in white collar jobs, and to proceeding on that basis to worry as to whether the higher skill requirements thus evidenced were matched by improvements in the labor force. There is very little reference to the force of relative wage rate changes in alleviating compositional differences in the supply and demand for labor, although the suggestion that minimum wages are behind our unemployment troubles is discussed and rejected.

We may wish Dr. Gilpatrick had addressed the problem of the time span of the adjustment process. Many of the "structural changes" she finds occurred in the 'fifties. Sudden developments may certainly cause temporary dislocations, but one should not lightly assume that the economy's adaptive mechanisms are so deficient or absent that seven to ten years later these changes are still largely undigested.

Although not without its faults, which derive mainly from the difficulty of the subject, the book has important virtues. There are many worthwhile insights, such as the author's emphasis on the fact that inadequate demand and structural problems can interact and reinforce one another. It is a highly valuable compilation and description of data relative to labor force analysis and will prove a resource to researchers in the field: if you are thinking of a regression, Dr. Gilpatrick has probably already run it.

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*Employment Problems of Automation and Advanced Technology: An International Perspective.* Edited by JACK STIEBER. New York: St. Martin's Press; London: Macmillan, 1966. Pp. xvii, 479. $16.00.

*Most Notorious Victory: Man in an Age of Automation.* By BEN B. SELIGMAN. New York: The Free Press; London: Macmillan, 1966. Pp. xviii, 441. $7.95.

Generally speaking, these volumes deal with the social and economic effects of technological change. But for the most part they emphasize, although in different ways, the impact of automation on the demand for and supply of labor.

*Employment Problems* is the more analytical of the two books. It consists

of the proceedings of a conference held at Geneva in the summer of 1964 by the International Institute for Labour Studies. The volume is divided into five parts with the five papers in Part I providing the backdrop for the rest. Part II contains six papers dealing with the impact of automation on the level and structure of employment and unemployment in both Europe and the United States. Two of these, those by George Hildebrand and Charles Killingsworth, analyze the causes of the then prevailing relatively high unemployment rates in the United States and argue, respectively, the case for the "inadequate aggregate demand" and the "rise in structural unemployment" hypotheses. The four papers in Part III are concerned with the education and training of the work force in an age of automation. The most interesting of these are Margaret Gordon's comparison of retraining programs in the United States and Europe and J. H. Smith's discussion of problems and policies relating to labor mobility. Parts IV and V, each containing four papers, deal with the impact of automation on management and industrial relations, respectively. Of most interest are Thomas Whisler's analysis of the impact of "information technology" on managerial decision-making and Theodore W. Kheel's discussion of the ways in which collective bargaining is adjusting to the changes brought about by automation. The Appendix consists of a background paper containing a survey of the literature in the areas covered by the conference.

*Most Notorious Victory* is of an entirely different cast. Seligman is not only a prodigious scholar but a superb polemist. He literally compels us to travel with him through an enormous Chamber of Horrors in which all kinds of automated devices, together with their effects, are exhibited. We are fascinated and impressed but when the ordeal is over and we are safely out, we somehow remain unconvinced that man in an automated age is (or will be) in some important sense less human than before and that the new technology carries with it net losses in economic and social welfare. This is not to say that Seligman may not be right, much less that events may not prove him to be right, but only that an attempt to demonstrate a thesis such as his by induction alone is apt, at best, to leave most skeptical readers merely somewhat less skeptical than before.

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*Toward a Manpower Policy.* Edited by ROBERT AARON GORDON. New York: John Wiley & Sons, 1967. Pp. x, 372. $8.95.

This is the fourth volume to emerge from a series of annual conferences on Unemployment and the American Economy organized by the University of California under a grant from the Ford Foundation. The earlier volumes were largely research-oriented, and dealt with a broad spectrum of issues relating to the measurement, anatomy, and causes of unemployment within the framework of postwar institutions and economic policies. The emphasis in the present volume, for the most part, is on the policy implications of the rise during the 1960s of a variety of governmental programs designed to affect the supply side of the labor market.

In addition to an introduction by Professor Gordon, the book contains ten papers, the text of a Task Force report to the Secretary of Labor on the U. S. Employment Service, and comment by 18 discussants. Participants were drawn from the federal government, universities, private research organizations, and the labor and business communities. One paper was presented by an authority from abroad—almost predictably, from Sweden. As with any symposium, the papers are somewhat uneven, and in some instances are overshadowed in terms of interest and challenge by the remarks of the commentators.

As Arnold Weber points out in the present volume, "most manpower issues have been and will continue to be resolved by private individuals and institutions." This leads to the basic question of the role of government in manpower policy. Certain activities, such as the maintenance of a comprehensive manpower information system and an energetic and imaginative public employment service, are clear. Beyond this, remarkably elastic definitions can be given to manpower policy, as illustrated in the papers by Garth Mangum and Philip Arnow and by a concluding evaluative discussion by John Dunlop. Even if one adopts a relatively narrow view of the government role, Dunlop is surely correct in suggesting that "manpower policy has reached a time for reflection, administrative review, and consolidation."

The manpower legislation of the 1960s has sought mainly to increase training and job opportunities, initially for experienced workers who had suffered technological displacement, but more recently for disadvantaged segments of the population. None of the papers presents a systematic account of the development of these programs, but Gerald Somers offers a highly useful analysis of the limited insight thus far gained into their role and effectiveness. Although he considers the preliminary indications generally favorable, he urges much more extensive research into all aspects of government manpower training and relocation programs, with particular emphasis on their significance as social investments. Indeed, these programs thus far have necessarily had a strong experimental flavor. Since this conference was held (June 1966), there has been evidence of some shifts in emphasis—for example, in the direction of on-the-job rather than institutional training. The oldest form of public training for specific occupational skills, vocational education, is discussed in excessively general terms by David S. Bushnell.

The critical importance for manpower policy of a strong Employment Service is recognized in the present volume by publication, as previously noted, of a Task Force report to the Secretary of Labor. The work of this group, which was headed by George P. Shultz, is likely to have more long-run impact than most similar exercises. The Task Force proposes extensive improvements in Employment Service programs and administration within the boundaries of its federal-state structure. Some of the proposals will require legislative action; others can be administratively introduced. Above all, if the Employment Service is to become the "comprehensive manpower services agency" envisioned by the report, greater employer cooperation and use is required. This and a number of other important questions on the employer role in manpower policy are discussed in a short but thoughtful paper by Charles A. Myers.

It is a remarkable fact that little attention has been given to wage levels and

structures and to public and private wage policy in discussions of manpower policy in recent years. The present volume suffers from this deficiency, relieved only by a section in Richard A. Lester's provocative paper on the role of organized labor. A well-articulated labor market policy plainly must involve consideration of the wage aspects of the employment bargain.

As a nation, we are groping toward a more comprehensive and "active" manpower policy, which, as Lester C. Thurow shows in an excellent paper, potentially can lend support to the attainment of a variety of goals, such as economic growth, price stability, and the elimination of Negro-white income differences. In an essentially developmental phase of policy formation, a symposium such as this performs an extremely useful function, if only by raising many of the questions that need to be considered in policy decisions.

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*Unions in Postwar America: An Economic Assessment.* By FRANK C. PIERSON. New York: Random House, Alfred A. Knopf, 1967. Pp. x, 143. $4.95; paper, $2.95.

This relatively short volume assesses the economic impact of unions by studying the gains in employee compensation (wages plus major supplements) resulting from collective bargaining negotiations in a relatively small number of unions and industries in the United States. The study is further restricted by evaluating the pay increases with respect to four basic criteria only: (1) the average gains in earnings in all manufacturing, (2) the prevailing market forces, (3) changes in output per man-hour, and (4) changes in product prices. Nevertheless, the analysis, which covers both the macro- and microeconomic level, emerges in somewhat broad strokes.

On the macro level, the study considers whether the gains achieved by some ten to twelve major unions have been consistent with the national goals of price stability and employment expansion (teamster, automobile, steel, machinists, electrical workers, carpenters, other construction, mine, railroad). The conclusions are in general agreement with other attempts to evaluate the impact of unions on wages and prices. During a period of strong demand (1947-1953), market forces dominated wage rises, and these unions affected the overall outcome little. As the expansionary market factors began to subside, however, from 1953 to 1958, the influence of major unions became more significant. Their gains in wages and fringe benefits substantially exceeded those for all manufacturing and outran average productivity increases. In addition, the gains of these unions affected the size of increases required to attract workers in the expanding, less unionized industries, some of which could not offset the increases with productivity gains. Thus, collective bargaining involving these unions accentuated the tendencies toward price rises and the unemployment "creep" already existing in the economy.

In the following years, 1958-1964, the greater ease in product and labor markets resulted in wage gains by the major unions which averaged around the 3 per cent trend value of productivity increases. Partly this is explained by

increasing product market competition, both internationally and domestically, as the result of substantial, underutilized capacity. The author also suggests, however, that the unions could have obtained larger increases after 1961 and that their more moderate policy resulted, in part, from a reduction in inter-union rivalry and the stabilization of the cost of living. He also holds out the hope that in the absence of inflationary pressures from increased armament expenditures, productivity gains might keep up with more moderate demands of unions. The elimination of the opportunity to test Pierson's thesis might, perhaps, be considered one of the minor tragedies of developments in U.S. Vietnam policy since 1965.

At the microeconomic level, the work evaluates the extent to which union negotiations have produced results contrary to the outcome expected from a competitive market system. The analysis is based on a comparison of gains in employee compensation in three groups: (1) ten large-scale manufacturing industries, in which product markets are considered oligopolistic (transportation equipment, basic aluminum, chemicals, rubber, electrical machinery, flat glass, motor vehicles, petroleum products, metal cans, basic steel); (2) nine small-scale industries, in which product markets are essentially competitive (paperboard containers, furniture, commercial printing, apparel, food, textiles, lumber, leather, bituminous coal); and (3) construction and trucking.

Comparison of the large-scale and small-scale sectors provides a useful tool for an economic assessment of unions. Pay increases in the large-scale industries exceeded the average gains of all manufacturing and showed considerable uniformity, despite wide variations, particularly after 1953, in changes in output and employment among the several industries. In contrast, six of the nine small-scale industries experienced increases in earnings less than the average rise for all manufacturing. The relative gains in the small industries also were consonant with the relative changes in output and employment.

Although the unions in the large-scale industries were less subject to market pressures than those in the small-scale sector, the impact on unit labor costs was more widely adverse in the latter. Particularly when output was expanding, the large-scale firms were more successful than small-scale companies in achieving sufficient productivity gains to offset increasing wages. However, where output was not expanding, even for larger firms, unit labor costs increased and inhibited improvements in the output and employment situation within the industry.

The contrast between the two industries in prices was greater than the differences in productivity gains. Only two of the ten large-scale as compared with seven of the nine small-scale industries showed price increases smaller than the average rise of prices for all manufacturing. While the differences between the two groups were not so great after 1953, they were still evident. Moreover, relative price movements frequently were in opposition to output changes in the large-scale industries, whereas those two tended to move in the same direction in the small-scale sector.

Both construction and trucking recorded pay gains greater than the average for all manufacturing, and in the case of the former these relatively larger gains continued through periods when demand was not increasing. In neither case

could productivity gains keep up with the rise in wages, although from 1957 to 1964, unit labor costs were relatively stable in trucking. In both cases, prices rose substantially more rapidly than the average for all manufacturing, with prices in trucking rising 50 per cent more rapidly than in construction, despite a substantially smaller increase in unit labor costs. While the sustained expansion in product demand was doubtless the paramount factor in this relatively rapid rise, the increasing uniformity in wage gains brought about by the union encouraged trucking firms to apply for rate increases, confident that their competitors would have to do likewise.

As have a number of previous works, the study, through its comparison of the three groups of industries, suggests that the combination of highly organized unions and not so highly competitive product markets will produce relatively large wage increases. The author points out that in many instances these relatively large increases were offset by productivity gains so that from the standpoint of unit labor costs, the possibly adverse economic effects were minimized. There remains, however, the possibility of an economic distortion of the wage structure and thereby a less than optimal allocation of resources. Thus the need for continued study of the industrial wage structure to determine whether artificial differentials are increasing as a result of the higher paid industries continuing to obtain larger wage hikes than the lower paid is indicated.

Wage rates are not established unilaterally in unionized industries; they result from bargaining. The record in the competitive sector suggests that one of the best guarantees of reasonable wage bargains is the pressure of product markets, which strengthens the resistance of employers. The study, however, raises the possibility that unionization may reduce product market competition as inefficient firms or those unable to finance labor-saving machinery to offset wage increase are caught between hard product markets and rising wages. Such a process could result eventually in more concentration and less competition. With free access to markets for managerial personnel and capital, however, that outcome hardly seems inevitable.

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# NOTES

*The Journal of Money, Credit and Banking,* a quarterly, will be published by the Ohio State University. The first issue is planned for December 1968. The new journal is broadly conceived and covers both policy orientation and analytical interests. The topics encouraged by the Editorial Board include monetary analysis and monetary policy, credit policy and credit market institutions, debt management and fiscal policy problems, issues in banking structure or portfolio analysis, approaches to bank behavior in the context of some theory of the firm, and international financial problems. Descriptive institutional material and the results of quantitative analysis will find a forum in the journal. It is particularly planned to develop symposia on topical issues, encourage review articles or discussion of official documents bearing on major policy problems. An Editorial Board of outstanding economists has been constituted to guide journal policies. Papers to be submitted for publication should be mailed to the Editor, Professor Karl Brunner, Ohio State University. Information concerning subscriptions will be provided by the Ohio State University Press. Detailed descriptions of the new journal and a formal invitation to subscribe will be mailed within two months.

## SENIOR FULBRIGHT-HAYS AWARDS FOR 1969-70

Applications are now being accepted for Fulbright-Hays appointments for university lecturing and advanced research abroad during 1969-70. It is expected that specialists in economics and business administration will receive awards for work in about thirty countries. The basic application requirements are: U.S. citizenship; a doctoral degree or equivalent status for research; college or university teaching experience for lecturing appointments; in some cases, proficiency in a foreign language.

Senior Fulbright awards generally consist of a maintenance allowance in local currency to cover normal living costs of the grantee and family while in residence abroad, and roundtrip travel for the grantee (transportation is not provided for dependents). For lecturers going to most non-European countries, the award includes a dollar supplement, subject to the availability of funds; or it carries a stipend in dollars and foreign currency, the amount depending on the assignment, the lecturer's qualifications, salary, and other factors.

For lecturing awards under the 1969-70 program, application before June 1, 1968 is strongly recommended. The deadline for research applications is June 1, 1968. Application forms, a list of openings in economics and business administration, and details on the terms of awards for particular countries are available from the Committee on International Exchange of Persons, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

## *Announcements*

The East African Institute of Social Research in Kampala, Uganda, has changed its name to the Makerere Institute of Social Research. The Institute, now more closely integrated with the various social science departments of Makerere University College, retains its main function, to organize and conduct independent research studies on the economic, social and political problems of East Africa.

Other functions of the Institute are to provide research experience for young East Africans interested in academic careers, to develop teaching materials for university students, and to undertake contract research for government agencies on short-term policy issues. Research workers at the Institute have access to a working library dealing almost entirely with Africa and to a modern electronic computer.

The Institute of Social Research has for the past twenty years provided a research center with which visiting research workers from overseas may affiliate. Information about the Institute's publications, current research projects, and procedures for affiliation can be obtained from The Research Secretary, Makerere Institute of Social Research, P.O. Box 16022, Kampala, Uganda.

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The American University is sponsoring the Eighth Annual Washington Conference on Business-Government Relations on April 1 and 2, 1968 at the Shoreham Hotel in Washington, D.C. Information about the conference may be obtained from Robert W. Miller, Director, Business-Government Relations Program, School of Business Administration, The American University, Massachusetts and Nebraska Avenues, N.W., Washington, D.C. 20016.

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The California Institute of International Studies announces a conference on The Economic Integration of Latin America: The Movement toward Latin American Unity. The conference will be held on May 9-11, 1968 in Palo Alto, California. The following topics will be discussed: (1) economic aspects of integration: common market, trade, and payments; (2) economic aspects of integration: investments and financing; (3) integration in science, technology, and culture; (4) relations between the United States and Latin America with regard to economic integration; and (5) legal, institutional, and political aspects of economic integration.

Please address all correspondence concerning the conference to Professor Ronald Hilton, Executive Director, California Institute of International Studies, 766 Santa Ynez, Stanford, California 94305.

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The University of Colorado has received a grant from the National Science Foundation for a summer institute in *Computer Science in Social and Behavioral Science Research* for college teachers in the social and behavioral sciences. The Institute will be held in Boulder, Colorado, from June 17 to July 19, 1968. Each participant, a college or university teacher, will receive a stipend of $500 plus travel and dependency allowances. For application forms, which must be completed before April 15, write to Daniel E. Bailey, Ketchum 8, University of Colorado, Boulder, Colorado 80302.

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The Sociology and Law Program at the University of Wisconsin announces the 1968 Summer Institute in Behavioral Science and the Law. Sponsored by the National Science Foundation, the Institute will offer graduate courses and seminars on the political, social, economic, and legal aspects of legal systems. The focus will be interdisciplinary, and the faculty will be professors of sociology, political science, economics, law, and anthropology. Students who are admitted will receive a stipend and travel allowance, and may receive graduate credit for courses taken. For information write to Professor Joel B. Grossman, Director, Summer Institute in Behavioral Science and Law, 216 North Hall, University of Wisconsin, Madison, Wisconsin 53706.

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The Survey Research Center of the University of Michigan will hold its twenty-first Summer Institute in Survey Research Techniques in 1968. The Institute is designed for men and women engaged in business and governmental research and other statistical work and for graduate students and university instructors interested in quantitative research in the social sciences. There will be two four-week sessions, the first from June 24 to July 19 and the second from July 22 to August 16. The two sessions may be taken independently or successively. Detailed information may be obtained from the Director, Survey Research Center, The University of Michigan, P.O. Box 1248, Ann Arbor, Michigan 48106.

The 53rd Annual Meeting of the Association for the Study of Negro Life and History will be held on October 3 to 6, 1968 at the New York Hilton Hotel. Persons interested in proposing sessions or papers, or in other participation, should write Walter Fisher, Program Chairman, Department of History, Morgan State College, Baltimore, Maryland 21212.

## Deaths

Robert H. Blosser, Ohio State University, Columbus, Ohio, September 29, 1967.

Vincent F. Boland, professor of economics, University of Arizona, November 20, 1967.

Harry A. Bonham, dean and professor emeritus of marketing, University of Alabama, June 18, 1967.

John A. Bryson, professor of economics, School of Commerce, New York University, December 5, 1967.

Walter J. Couper, May 26, 1967.

W. A. Guinn, professor of business administration, University of Arkansas.

Robert R. McKenzie, associate professor of finance, New York University, August 28, 1967.

James A. Reffner, May 24, 1967.

G. Lincoln Sadelin, July 15, 1967.

Jacob Schmookler, professor of economics, University of Minnesota, October 3, 1967.

Bruno Suviranta, August, 1967.

David McCord Wright, University of Georgia, January 6, 1968.

Charles A. Yager, associate adviser, Division of International Finance, Federal Reserve Board, September 20, 1967.

## Retirements

Chelcie C. Bosland, professor of economics, Brown University, June 1968.

Clarence W. Efroymson, professor of economics, Butler University, June 1968.

David McKinney, professor of economics and associate director of economic research, University of Mississippi, June 1967.

Paul Rosenstein-Rodan, professor of economics, Massachusetts Institute of Technology, July 1968.

Frank W. Tuttle, professor of economics, University of Florida, June 30, 1967.

Clair Wilcox, Joseph Wharton professor of political economy, Swarthmore College, January 1968.

Lowell C. Yoder, associate professor of marketing, University of Florida, August 31, 1967.

## Visiting Foreign Scholars

Michael A. Heilperin, University of Geneva; visiting professor of business administration, University of Southern California.

Janos Kornai, Hungarian Academy of Sciences: visiting research economist, Stanford University, spring 1968.

Takashi Negishi, University of Tokyo: Hill Foundation visiting professor of economics, University of Minnesota, 1968.

Tokue Shibata, Tokyo Metropolitan University: visiting professor of economics and sociology, Grinnell College, spring 1968.

Prasad Ram Rajbahak, Tribhuvan University, Nepal: visiting lecturer in economics, Southern Illinois University, 1967-68.

T. E. Smith, Institute of Commonwealth Studies, London: visiting lecturer in demography, Wharton School of Finance and Commerce, University of Pennsylvania.

Peter J. Wiles, London School of Economics: visiting professor of economics, The City College of the City University of New York, fall 1967.

## Promotions

John W. Birch: professor of econometrics, University of Wyoming.

Michael E. Borus: associate professor of labor and industrial relations, Michigan State University.

Dale C. Dahl: associate professor of agricultural economics, University of Minnesota.

Albert L. Danielsen: associate professor of economics, College of Business Administration, University of Georgia.

Charles Floyd: associate professor of finance, College of Business Administration, University of Georgia.

Jack M. Guttentag: professor of economics, Wharton School of Finance and Commerce, University of Pennsylvania.

Raymond W. Hooker: professor of economics, University of Wyoming.

James P. Houck Jr.: associate professor of agricultural economics, University of Minnesota.

Richard W. Judy: professor of economics, University of Toronto.

Moon H. Kang: associate professor of economics, University of Missouri at Rolla.

E. J. Leverett Jr.: associate professor of insurance, College of Business Administration, University of Georgia.

G. F. McGuigan: associate professor of economics, University of British Columbia.

A. Milton Moore: professor of economics, University of British Columbia.

William H. Parks: assistant professor of finance, College of Business Administration, University of Oregon.

Peter H. Pearse: associate professor of economics, University of British Columbia.

Melvin Rothbaum: professor of labor and industrial relations, University of Illinois.

Abraham Rotstein: assistant professor of economics, University of Toronto.

George Slasor: associate professor of economics, University of Toronto.

John W. Soha: associate professor of accounting, College of Business Administration, University of Oregon.

Phillip Taylor: associate professor, University of Arkansas.

Richard Towey: associate professor of economics, Oregon State University.

Douglas Vickers: professor of finance, Wharton School of Finance and Commerce, University of Pennsylvania.

Murray Wolfson: associate professor of economics, Oregon State University.

## Administrative Appointments

David H. Boyne, Michigan State University: chairman, department of agricultural economics and rural sociology, Ohio State University.

Robert D. Brown Jr.: assistant professor and assistant director of the Institute of Management System and Development Analysis, College of Business Administration, University of Georgia.

Harold K. Charlesworth: director, Office of Development Services and Business Research, College of Business and Economics, University of Kentucky.

Alfred H. Conrad: chairman, department of economics, The City College of the City University of New York.

Jerome J. Dasso: associate director, Bureau of Business and Economics Research, College of Business Administration, University of Oregon.

Noel J. J. Farley: chairman, department of economics, Goucher College, September 1968.

Marvin Frankel: chairman, department of economics, University of Illinois.

Donald D. Frederick: acting head, department of marketing, College of Commerce and Business Administration, University of Illinois.

Eleanor Gilpatrick, Skill Advancement, Inc.: associate professor and director, Health Services Mobility Study, City University of New York.

Mark R. Greene: professor of insurance and director, Center for International Business Studies, College of Business Administration, University of Oregon.

John D. Guilfoil: vice chairman, department of economics, School of Commerce, New York University.

Lafayette G. Harter Jr.: chairman, department of economics, Oregon State University.

Richard M. Hill: acting head, department of industrial administration, College of Commerce and Business Administration, University of Illinois.

John Kane: vice president for business, College of Business Administration, University of Arkansas.

Darrell Lewis, Luther College: director, Minnesota Council for Economic Education.

Jan B. Luytjes: deputy director, Office of Development Services and Business Research, College of Business and Economics, University of Kentucky.

Lee R. Martin: acting director, Economic Development Center, University of Minnesota.

Robert V. Mitchell: acting director, Executive Development Center, College of Commerce and Business Administration, University of Illinois.

Edward A. Mosca: chairman, department of economics, Albertus Magnus College.

Abdul Hameed Naz: chief, research division, Maryland-National Capital Park and Planning Commission.

John Owen, University of Houston: dean, College of Business Administration, University of Arkansas, 1967-68.

Alberto M. Piedra: chairman, department of economics, Catholic University of America; October 1967 to September 1969.

Frank C. Pierson: chairman, department of economics, Swarthmore College.

Harold K. Strom: associate professor of transportation and director, Transport and Logistics Research Center, College of Business Administration, University of Oregon.

Donald S. Tull; professor of marketing and head, department of marketing, insurance and transportation, College of Business, University of Oregon.

## Appointments

John Allen: department of economics, Texas A&M University.

R. Clifton Andersen, University of Texas: Southern Illinois University.

James W. Angell: visiting professor of economics, University of Florida, winter quarter.

Richard F. Barton, University of Kansas: professor of management, Texas Technological College.

Hite Bennett: assistant professor, department of finance and insurance, University of Florida.

Ernest Bloch: Charles William Gerstenberg professor of finance, School of Commerce, New York University, 1967-68.

Marshall E. Blume: lecturer in finance, Wharton School of Finance and Commerce, University of Pennsylvania.

David E. Bond: assistant professor of economics, University of British Columbia.

Elizabeth Bond: instructor in economics, University of British Columbia.

D. K. Bose: visiting associate professor of economics, Iowa State University.

Be:t Bowden: department of economics, Texas A&M University.

John Brode: instructor in economics, Wellesley College.

M. W. Bucovetsky: lecturer in economics, Scarborough College, University of Toronto.

Thomas W. Calmus: assistant professor of finance, College of Business Administration, University of Oregon.

Vincent E. Cangelosi, University of Texas: Louisiana State University.

Dcuglas R. Carmichael: assistant professor of accounting, University of Texas.

Rabert N. Carter: associate professor of marketing, College of Business Administration, University of Georgia.

Gregory C. Chow, IBM: adjunct professor of economics, Columbia University, spring 1968.

Carolyn Clark: assistant professor of economics, University of British Columbia.

Rcbert E. Coleberd Jr.: staff economist, Machinery and Allied Products Institute, Washington, D.C.

Alfred H. Conrad, City College: research staff associate, National Bureau of Economic Research, 1968.

John G. Cragg: assistant professor of economics, University of British Columbia.

Maureen S. Crandall: instructor in economics, Wellesley College.

J. F. Dingle: lecturer in economics, University of Toronto.

John Dockendorf: assistant professor of economics, Luther College.

Jack P. Doll, University of Missouri: visiting professor of agricultural economics, University of Minnesota, fall 1967.

Jeanne Dost: assistant professor of economics, Oregon State University.

Wilford J. Eiteman: visiting professor, department of finance and insurance, University of Florida, winter 1968.

C. E. Elias Jr.: assistant professor of finance and business economics, University of Southern California.

Gary D. Eppen: associate professor of industrial administration, Graduate School of Business, University of Chicago, July 1, 1968.

John Ernst, Luther College: University of Northern Iowa.

Michael D. Everett, El Colegio de México: assistant professor, Florida State University.

Franklin M. Fisher, Massachusetts Institute of Technology: research staff associate, National Bureau of Economic Research, 1968.

Lyndell W. Fitzgerald: associate professor of agricultural economics and extension service economist, University of Minnesota, spring 1968.

John C. Fleming: instructor in economics, College of Business Administration, University of Georgia.

Richard E. French: assistant professor of economics, University of Florida.

Malcom Galatin, University of Western Ontario: assistant professor, The City College of the City University of New York.

George Garvy, Federal Reserve Bank of New York: adjunct professor of economics, Columbia University, spring 1968.

David T. Geithman: assistant professor of economics, University of Florida.

Bhaskar K. Ghosh: visiting associate professor of statistics, Massachusetts Institute of Technology, spring 1968.

Fred W. Glover: associate professor of statistics, University of Texas.

John M. Godfrey: instructor in economics, College of Business Administration, University of Georgia.

Louis M. Goreux, Food and Agriculture Organization, United Nations: adviser, economics department, World Bank Group.

D. John Grace: instructor in accounting, Lebanon Valley College.

Philip Gramm: department of economics, Texas A&M University.

Isabelle A. Granger: lecturer, department of economics and commerce, Simon Fraser University, spring 1968.

Glen A. Gransberg: assistant professor of economics, University of North Dakota.

Robert L. Greene: assistant professor of finance, College of Business Administration, University of Georgia.

Alan Gummerson: instructor, Grinnell College.

Alvin H. Hansen, Lucius N. Littauer professor of political economy emeritus, Harvard University: visiting professor of economics, University of California, San Diego, winter 1968.

Irvin Harvey: instructor in finance, College of Business Administration, University of Georgia.

R. Indra Hattari: assistant professor of insurance, College of Business Administration, University of Georgia.

John F. Helliwell: associate professor of economics, University of British Columbia.

Walter Hill: associate professor, department of management and business law, University of Florida.

William T. Hold: assistant professor of insurance, University of Texas.

James T. Hood, University of Texas: Louisiana State University.

Thomas G. Hopkins, University of Texas: Corning Glass Works, Corning, New York.

Donald W. Huffmire, Monmouth College: assistant professor of economics, Hartwick College.

Carlyle D. Hughes: assistant professor of accounting, University of Texas.

George M. Hutto Jr.: instructor in economics, College of Business Administration, University of Georgia.

Frank J. Imke, University of Texas: Texas Technological College.

John F. Kain, Harvard University: research staff associate, National Bureau of Economic Research, 1967-68.

Robert H. Keeley: lecturer in finance, Wharton School of Finance and Commerce, University of Pennsylvania.

Jerome B. Kernan, University of Texas: University of Cincinnati.

Felix P. Kollaritsch: visiting professor of accounting, University of Texas.

Ik Whan Kwon: instructor in economics, College of Business Administration, University of Georgia.

Zarrel V. Lambert: assistant professor of marketing, University of Texas.

Gerhard P. Larson: assistant professor of economics, University of North Dakota.

Hartley V. Lewis: assistant professor of economics, University of British Columbia.

Joseph G. Long: instructor in marketing, College of Business Administration, University of Georgia.

Edward S. Lynn: visiting professor of accounting, University of Texas.

Frank H. Maier: assistant professor of economics, Florida State University.

Philip Marcus, University of North Dakota: Department of Labor, Washington, D.C.

Norton E. Marks, University of Texas: University of Notre Dame.

Arturo C. Martinez-Holgado: assistant professor of marketing, University of Texas.

Frederick E. May: visiting professor of marketing, University of Texas.

Franklin L. McCarthy: acting assistant professor of accounting, College of Business Administration, University of Oregon.

Roland McKean: professor of economics, University of Virginia.

Robert D. McTeer Jr.: instructor in finance, College of Business Administration, University of Georgia.

Charles Mecimore: associate professor of accounting, College of Business Administration, University of Georgia.

Frederick Miller: assistant professor of economics, Oregon State University.

Joseph C. Mills: I.M.F. advisor on research, Reserve Bank of Malawi, Blantyre, Malawi, Africa.

Ralph A. Mills: instructor in economics, College of Business Administration, University of Georgia.

Terrance Moran: assistant professor of economics, Luther College.

Bruce W. Morgan, University of Illinois: assistant professor of finance, Wharton School of Finance and Commerce, University of Pennsylvania.

Andre L. Muller: visiting associate professor of economics, University of Florida.

Barbara W. Newell: associate professor of economics, University of Michigan.

Bruce E. Newling, Northwestern University: assistant professor, The City College of the City University of New York, 1967-68.

Richard L. Norgaard, University of Texas: University of Southern California.

Guy Orcutt, University of Wisconsin: senior adviser, economics department, World Bank Group.

Frank R. Page: associate professor of accounting, College of Business Administration, University of Georgia.

William M. Raike: assistant professor of business statistics, University of Texas.

Robert H. Rasche, Masssachusetts Institute of Technology: assistant professor of economics, Wharton School of Finance and Commerce, University of Pennsylvania.

James E. Reinmuth: acting assistant professor of quantitative analysis, College of Business Administration, University of Oregon.

Romney Robinson: professor of economics, University of Toronto.

Charles E. Rockwood: associate professor of economics, Florida State University.

George F. Rohrlich, School of Social Service Administration, University of Chicago: professor of political economy and social insurance, School of Business Administration, Temple University.

L. J. Rosenberg: associate professor of marketing, University of Arkansas, 1967-68.

Jerry M. Rowland: instructor in marketing, College of Business Administration, University of Georgia.

Thomas Sargent, Carnegie-Mellon University: research staff associate, National Bureau of Economic Research, 1967-68.

Lawrence L. Schkade, University of Texas: North Texas State University.

Gunter Schramm: associate professor of economics, University of Manitoba.

Richard A. Scott, University of Texas: University of Arizona.

Don Seastone: resources policy analyst, Public Land Law Review Commission, Washington, D.C.

Lloyd Seaton, University of New Mexico: assistant professor of accounting, University of Arkansas, 1967-68.

Lawrence H. Seltzer, Swarthmore College and Wayne State University: visiting professor of economics, Wharton School of Finance and Commerce, University of Pennsylvania, fall 1967-68.

Vernon L. Smith: professor of economics, Brown University, September 1968.

Montrose S. Sommers, University of Texas: University of Toronto.

Jean-Robert Spichiger: assistant professor of social sciences, The New Division, Nasson College.

Mandayam A. Sreedhar, M. N. Dastur and Co.: economist, economics department, World Bank Group.

Melvin L. Stone: instructor in economics, University of North Dakota.

Frederick D. Sturdivant: visiting associate professor of marketing, University of Texas.

John E. Swan: assistant professor of marketing, University of Texas.

Robert Swidinsky: assistant professor of economics, University of British Columbia.

Richard T. Taliaferro: senior economist, engineering report department, R. W. Booker & Associates.

Lee A. Tavis: assistant professor of finance, University of Texas.

William Terrill, Luther College: Wichita State University.

Ralph L. Thomas: professor of economics, California State College, California, Pennsylvania.

John P. Troxell: professor of economics and management, University of Mississippi, 1967-68.

Dale B. Truett: assistant professor of economics, University of Florida.

Marvin Tummins: associate professor of accounting, College of Business Administration, University of Georgia.

Ralph Turvey: The National Board for Prices and Incomes, London.

John H. vanderVeen: instructor in economics, Hartwick College.

John J. Voynich: associate professor of management, College of Business Administration, University of Georgia.

John J. Waelti: assistant professor of agricultural economics and extension service economist, University of Minnesota, fall 1967.

Charles Waldauer, Rutgers—The State University: assistant professor of economics, University of Delaware; and economist, Division of Urban Affairs.

William H. Waldorf: associate professor, Harpur College, State University of New York at Binghamton.

Alan Waters: department of economics, Texas A&M University.

Samuel H. Weese: assistant professor, department of finance and insurance, University of Florida.

Delane E. Welsch, Texas A&M University: assistant professor of agricultural economics, University of Minnesota, and agricultural economist, The Rockefeller Foundation, Bangkok.

Mark H. Willes, Columbia University: assistant professor of finance, Wharton School of Finance and Commerce, University of Pennsylvania.

T. A. Wilson: associate professor of economics, University of Toronto.

Sidney L. Winter: visiting professor of economics, University of California, San Diego, spring 1968.

John R. Wish: assistant professor of marketing, College of Business Administration, University of Oregon.

Bronislaw S. Wojtun, Susquehanna University: Indiana University of Pennsylvania.

Harold A. Wolf: visiting professor of finance, University of Texas.

Edgar W. Wood: assistant professor of economics, University of Mississippi, 1967-68.

John H. Wood, University of Birmingham: associate professor of finance, Wharton School of Finance and Commerce, University of Pennsylvania.

James A. Xander: instructor in economics, College of Business Administration, University of Georgia.

Gopal Yadav: instructor in economics, University of British Columbia.

Pan A. Yotopoulos: associate professor, Food Research Institute, Stanford University.

Shih Cheng Yu: visiting professor of accounting, University of Florida.

Marko Zuzic, Keystone Junior College: visiting lecturer, Graduate School of Business Administration, Temple University.

## Leaves for Special Appointments

Oswald H. Brownlee, University of Minnesota: Rockefeller Foundation representative in economics, University of Chile, 1967-68.

Arthur F. Burns, Columbia University: visiting professor of economics, Stanford University, spring 1968.

Paul G. Clark, Williams College: assistant administrator for program coordination, Agency for International Development, Washington, D.C.

Reynold P. Dahl, University of Minnesota: Minnesota-overseas assignment, Agency for International Development, Tunisia, 1967-69.

J. Malcom Dowling, University of Colorado: Fulbright visiting lecturer, University of Reading, England, 1967-68.

Selmer A. Engene, University of Minnesota: Minnesota-overseas assignment, Ford Foundation, Buenos Aires, fall and winter 1967-68.

Leslie Fishman, University of Colorado: visiting professor, University of Warwick, Coventry, England, 1967-68.

Lewis R. Gaty III, Swarthmore College: consultant, program evaluation staff, Bureau of the Budget, first semester 1967-68.

Robert H. Haveman, Grinnell College: senior economist, Joint Economic Committee Staff, U. S. Congress.

William S. Hendon, Texas Technological College: visiting professor of economics, Old Dominion College, spring 1967-68.

John D. Hyslop, University of Minnesota: Minnesota-overseas assignment, Agency for International Development, Tunisia, 1967-69.

Milton Z. Kafoglis, University of Florida: University of Tennessee.

John C. Narver, University of Washington: visiting research professor, Federal Trade Commission, Bureau of Economics, January-December 1968.

Roy W. Niemela, University of Florida: Bureau of the Budget, Washington, D.C.

John Peterson, University of Arkansas: economic advisor to the Governor of Arkansas, 1967-68.

Edward L. Phillips, University of Colorado: Fulbright visiting lecturer, Universidad Nacional Federico Villarreal, Lima.

Barry W. Poulson, University of Colorado: Fulbright visiting assistant professor, Universidad Autónoma de Guadalajara, Guadalajara, Mexico.

John P. Powelson, University of Colorado: consultant, Inter-American Development Bank, Washington, D.C., 1967-68.

G. S. Sahota, Vanderbilt University: Vanderbilt-USAID visiting professor of economics, University of São Paulo and economic advisor, Ministry of Finance, Government of Brazil.

Adolf F. Sturmthal, Center for Advanced Study, University of Illinois: visiting lecturer, Institute for Advanced Studies, Vienna, Austria.

D. A. Worcester Jr., University of Washington: Rockefeller Foundation Fellowship visiting professor, University of the Philippines.

## Resignations

Edwin H. Caplan, College of Business Administration, University of Oregon.

Simoa J. Kagan, College of Business Administration, University of Oregon.

Kenneth K. Kurihara, Rutgers—The State University, December 31, 1967.
Keith D. Skelton, College of Business Administration, University of Oregon.
Raymond D. Vlasin, University of Minnesota, December 1967.

## *Miscellaneous*

Joseph M. Gillman gave a paper at a Colloquium on Contemporary Theory of Political Economy convened at the J. W. Goethe University, Frankfurt, Germany, in September 1967 to commemorate the 100th anniversary of the publication of Marx's *Capital*.

# AMERICAN ECONOMIC ASSOCIATION
## EMPLOYMENT SERVICES

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### NATIONAL REGISTRY FOR ECONOMISTS

The National Registry for Economists was established in January, 1966, to provide a centralized nationwide clearinghouse for economists on a year-round basis. It is located in the Chicago Professional Placement Office of the Illinois State Employment Service and is staffed by experienced placement personnel, operating under the guidance and direction of Regional and National Bureau of Employment Security Professional Placement officials, and in cooperation with the American Economic Association. It is a free service. There are no registration, referral, or placement fees. Application and order forms used in the Registry are available upon request from the: National Registry for Economists, Professional Placement Center, 208 South La Salle Street, Chicago, Illinois, 60604.

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### VACANCIES AND APPLICATIONS

The Association is glad to render service to applicants who wish to make known their availability for positions in the field of economics and to administrative officers of colleges and universities and to others who are seeking to fill vacancies.

The officers of the Association take no responsibility for making a selection among the applicants or following up the results. The Secretary's office will merely afford a central point for clearing inquiries; and the *Review* will publish in this section a brief description of vacancies announced and of applications submitted (with necessary editorial changes). Since the Association has no other way of knowing whether or not this section is performing a real service, the Secretary would appreciate receiving notification of appointments made as a result of these announcements. It is optional with those submitting such announcements to publish name and address or to use a key number. Deadlines for the four issues of the *Review* are February 1, May 1, August 1, and November 1.

Communications should be addressed to: The Secretary, American Economic Association, 629 Noyes Street, Evanston, Illinois 60201.

#### Vacancies

*Economists, mathematicians, statisticians, operations analysts:* Needed by the Research Analysis Corporation to participate in defense-related studies of resource allocation techniques and applications. Areas of interest include systems analysis of defense forces, weapon systems, and manpower and material resources, and its constituent elements of cost-effectiveness analysis and military cost analysis. A strong capability is maintained in computer-assisted model building. Staff members are assisted in acquiring a working knowledge of computer techniques if they do not already have it. Candidates should have at least a master's degree. For additional information, send résumé to Mr. John G. Burke, Supervisor of Professional Staffing, Research Analysis Corporation, McLean, Virginia 22101.

*Economists:* The United Nations needs economists for challenging research and operational posts at Headquarters, New York, in Geneva, Vienna, and in many of the developing countries throughout the world. These posts are in various fields of specialization (development, econometrics, fiscal policy, foreign trade, international finance, industrial management, transportation, agriculture, mining, water resources,

urban planning), at all levels of responsibility and of varying duration—permanent or short term. Candidates with an M.A. or Ph.D. and experience in these fields are invited to contact for additional information: Office of International Organization Recruitment, Department of State, Washington, D.C. 20520.

*Economists:* General Electric's Center for Advanced Studies has openings for economists who are interested in solving problems of government and industry. Preferred training and background will include experience in operations research and a Ph.D. in economics. Offices are in Santa Barbara, California, and Washington, D.C. Write to: Dr. Stephen Enke, P.O. Box QQ, Santa Barbara, California 93102.

*Economist:* U.S. Army Corps of Engineers in Huntington, West Virginia, requires an economist in the Planning Branch. Positions are from grade level GS-5 ($5,565-$7,239) to GS-9 ($8,054-$10,475) and are part of the federal civil service program. Basic requirements are degree in economics or business administration, appropriate experience or training, and the ability to write well. The duties to be performed are: conduct and participate in the coordination of economic studies of river basins, apply professional techniques and principles of economics in formulating water resource investments, determine the potential effects of water resource investments upon the regional and national economy, develop data sources, develop and maintain contacts with specialists in the field. Limited travel and opportunity for additional education are available. Applicants for this position should apply to: Chief, Planning Branch, Huntington District, Corps of Engineers, P.O. Box 2127, Huntington, West Virginia 25721.

*Economists:* With continued growth and a new M.A. program in economics, the Department of Economics, California State College at Fullerton will have openings in September, 1968, for several additional staff members at the junior level, Ph.D. or near Ph.D. Although the particular areas of specialization in economics are open, we are interested in persons with strong fundamental grounding in economic theory. In general, the Department seeks persons with a high degree of technical economic competence, dedicated to teaching, and devoted to continuing professional activity and development. The College, 8 years old and rapidly expanding, is located on the fringe of the Los Angeles metropolitan area. For further details, write (enclosing detailed résumé): Dr. Levern F. Graves, Department of Economics, California State College, 800 North State College Boulevard, Fullerton, California 92631.

*Economist, chairman of department:* California State College at Fullerton is seeking a qualified economist to fill the position of chairman of its Department of Economics. The position requires a Ph.D. degree from a major university and evidence of scholarly writing, leadership, and administrative ability. The approximate salary range is $11,000 to $17,000, depending upon experience and qualifications. The Department of Economics is in the School of Business Administration and Economics. Major interest is directed toward the bachelor and master of arts programs in economics. In addition, the department offers undergraduate service courses for various majors in the college and provides graduate courses for the master of arts in social science and the master of business administration programs. The undergraduate program of the School of Business Administration and Economics is fully accredited by the American Association of Collegiate Schools of Business. California State College is a rapidly growing, eight-year old institution, located on the fringe of Los Angeles, 25 minutes from Newport Beach, an hour from the mountains, and within easy driving distance of the University of California at Irvine. The position of department chairman under growth conditions such as the college is experiencing, provides ample opportunity for innovation, dynamic leadership, and professional development. Please address inquiries to: Paul T. Kinney, Dean, School of Business Administration and Economics, California State College at Fullerton, Fullerton, California 92631.

*Labor economists and/or statisticians:* The measurement of the economic damages suffered by those who are wrongly injured or killed is a new area for the application of economic and statistical knowledge and research techniques. This field has been pioneered successfully and Associated Appraiser of Earning Capacity is now providing this service to attorneys on a nationwide basis. Those in it appraise the losses and are required to testify as an expert in court trials and must withstand hostile cross-examination. It is one of the highest-paid forms of work in the pro-

fession and it is possible to engage in it as a part-time activity. Requirements: (1) minimum status of associate professor; (2) experience in research in collective bargaining agreements and fringe benefit programs; (3) location in or near a major metropolitan area. Openings now available in some 20 cities. Waiting list open in other areas. Send résumé and list of publications to: Philip Eden, President, Associated Appraisers of Earning Capacity, 1303 Walnut Street, Berkeley, California, 94709.

*Senior economists:* CONSAD Research Corporation has immediate positions available in Pittsburgh and New York City. The work is long range and involves participation in interdisciplinary systems research and planning, applying modern analytic methods to public and private sector problems. For a personal discussion about these opportunities, please send a complete résumé to: Dr. Wilbur A. Steger, CONSAD Research Corporation, Pittsburgh, Pennsylvania, 15213.

*Economic statistics, operations analysis, management science and/or management systems:* New Department of Management Sciences needs three additional Ph.D.'s February or September, 1968. Rank and salary commensurate with qualifications. TIAA, life, disability, and major medical insurance and other fringe benefits. Please send résumé to: Dr. Sam Barone, Chairman, Department of Management Sciences, St. Louis University, School of Commerce and Finance, 3674 Lindell Boulevard, St. Louis, Missouri, 63108.

*Management:* Professor who is Ph.D. in economics or D.B.A. (or candidate for either degree) sought to teach in three-course sequence in the field of management in new master of business administration program: fall, 1968, advanced management theory; spring, 1969, quantitative aspects of management; fall, 1969, the legal environment of business. Other courses will be assigned at the graduate level or in extensive undergraduate majors in accounting, business administration, or economics, in accordance with the candidate's aptitudes and preferences. Nine-months' salary up to $15,000 for candidate with doctoral degree and teaching experience. Please send résumé to: W. P. Carton, Acting Chairman, Department of Accounting, Business Administration, and Economics, Loyola College, Baltimore, Maryland, 21210.

*Finance:* Professor who is Ph.D. in economics or D.B.A. (or candidate for either degree) sought to teach in three-course sequence in the field of finance in new master of business administration program: fall, 1968, financial management; spring, 1969, financial institutions; fall, 1969, investment analysis. Other courses will be assigned at the graduate level or in extensive undergraduate majors in accounting, business administration, or economics, in accordance with the candidate's aptitudes and preferences. Nine-months' salary up to $15,000 for candidate with doctoral degree and teaching experience. Please send résumé to: W. P. Carton, Acting Chairman, Department of Accounting, Business Administration, and Economics, Loyola College, Baltimore, Maryland, 21210.

*Marketing:* Professor who is Ph.D. in economics or D.B.A. (or candidate for either degree) sought to teach a three-course sequence in the field of marketing in new master of business administration program: fall, 1968, marketing management; spring, 1969, marketing research; fall, 1969, sales and advertising policies. Other courses will be assigned at the graduate level or in extensive undergraduate majors in accounting, business administration, or economics, in accordance with the candidate's aptitudes and preferences. Nine-months' salary up to $15,000 for candidate with doctoral degree and teaching experience. Please send résumé to: W. P. Carton, Acting Chairman, Department of Accounting, Business Administration, and Economics, Loyola College, Baltimore, Maryland, 21210.

*Accounting methods:* Professor who is Ph.D. in economics or D.B.A. (or candidate for either degree) sought to teach in three-course sequence in the field of accounting methods in new master of business administration program: fall, 1968, managerial accounting; spring, 1969, advanced accounting theory; fall, 1969, accounting systems. Other courses will be assigned at the graduate level or in extensive undergraduate majors in accounting, business administration, or economics, in accordance with the candidate's aptitudes and preferences. Nine-months'

salary up to $15,000 for candidate with doctoral degree and teaching experience. Please send résumé to: W. P. Carton, Acting Chairman, Department of Accounting, Business Administration, and Economics, Loyola College, Baltimore, Maryland, 21210.

*Accounting and business administration:* September, 1968. Professor with M.B.A. and C.P.A. sought to teach principles of accounting, intermediate accounting, corporation finance (in first semester) and money and banking (in second semester). Size of undergraduate department makes it possible, however, to shift teaching assignments to fit individual capabilities. Class sections are small, generally 20 to 30 students. Our salaries are competitive with anything which is available throughout the country. Please send résumé to: W. P. Carton, Acting Chairman, Department of Accounting, Business Administration, and Economics, Loyola College, Baltimore, Maryland, 21210.

*Economists:* Ph.D. Three positions. One or more of the following specialities: econometrics and quantitative methods, economic history, comparative economic systems, public finance, history of economic thought, and labor economics. State university. Rank of assistant or associate professor; salary range from $11,000 to $15,000; generous benefits; nine-hour teaching load. Send inquiries and a complete résumé to: Robert M. Biggs, Department of Economics, College of Arts and Sciences, University of Toledo, Toledo, Ohio, 43606.

*Economics:* The University of Alaska offers funded research opportunities for economics graduate students from other universities. We solicit especially candidates shopping for dissertation topics in regional economic development, resource economics (minerals, fisheries, forestry, etc.), demography, studies of subsistence economies, state and local finance, and the economics of investment in human resources. The University can provide office or laboratory space and exceptional technical support (secretarial, computer, etc.). Work with small but energetic interdisciplinary faculty. Minimum salary for senior research assistant with master's degree or equivalent is $900 a month. Write to: Victor Fischer, Director, Institute of Social, Economic and Government Research, University of Alaska, College, Alaska, 99701.

*Economists:* There are vacancies for two young economists, starting September, 1968. One position would involve teaching undergraduate and graduate courses in quantitative analysis, econometrics and statistics. Second position ideally would be held by an economist management/marketing specialist, with strong background in behavioral sciences. Ph.D. degree preferred. Salary up to $12,500 for nine months; opportunities for summer school teaching and for participating in research projects. Present enrollment at the University is about 4,000 students and is expected to double within the next five years. Write to: Dr. Andre Simmons, Chairman, Department of Economics, Nevada Southern University, Las Vegas, Nevada, 89109.

*Economists:* Indiana University of Pennsylvania, the state's newest university and third largest in undergraduate enrollment, has permanent position openings for the fall of 1968 for two economists, one with strength in general theory and international economics and one in general theory and public finance, also preferably business fluctuations. Each must also teach at least one section of principles regularly. Twelve-hour teaching load maximum, controlled class size. Rank of instructor, assistant or associate professor available dependent upon qualifications. Ph.D. or near-Ph.D. in economics required. Teaching excellence emphasized, research encouraged, professional growth prospects most favorable. Salary range for nine months: instructor, $6,580-$8,820; assistant professor, $7,610-$10,200; associate professor, $9,260-$12,400. Summer supplement normally available on prorated salary basis. Excellent fringe benefits. Write to: Dr. Francis G. McGovern, Chairman, Department of Economics, Indiana University of Pennsylvania, Indiana, Pennsylvania, 15701.

*Economists:* The expanding contract research program of the Dikewood Corporation has created openings at various professional levels for researchers with a graduate degree. Knowledge of computer programming is desirable. Opportunities exist in mathematical economics, medical economics, cost-benefit analysis, regional and in-

ternational development, transportation research, cost analysis, operations research, program-planning-budget analysis to work individually or as project leader. Most study projects involve multidisciplined efforts and thus provide the chance to broaden one's perspective and experience in other academic fields. Studies are performed for military aero space, commercial, and governmental, nondefense customers. Dikewood Corporation is an organization of consulting scientists formed ten years ago in order to provide services in the fields of systems analysis, applied research, computer sciences, stock market investment advisory service, and mutual fund management. Please contact: Robert M. Carlisle, Dikewood Corporation, University Research Park, 1009 Bradbury Drive, S.E., Albuquerque, New Mexico, 87106.

*Economists, junior and senior levels:* Major New York City financial institution needs economists at junior and senior level. Emphasis will be in areas of (1) macroeconomic analysis and forecasting, (2) financial and money market analysis, and (3) industry and regional projections. Econometric models will be used in all areas. Original research encouraged. Training in statistics and econometrics necessary. Junior level: minimum M.A. or equivalent; senior level: Ph.D. or equivalent. Salary commensurate with training and experience plus excellent fringe benefits. Write to: Mr. Kenneth E. MacRae, Personnel Officer, Bank of New York, 48 Wall St., New York, New York, 10015.

*Economists:* A beautiful state college on the California coast, midway between San Francisco and Los Angeles, aiming at excellence in undergraduate teaching, invites well-qualified and dynamic teachers to apply for three teaching vacancies at all rank levels. Qualifications: at least three years of teaching experience and/or passed Ph.D. qualifying examinations. No discrimination based on age or sex. A background in some of the following fields is required: econometrics, American economic history, micro- and macroeconomic theory, operations research, economic history, monetary theory, and labor economics. Staff emphasis will be in teaching an undergraduate economics program and some courses will service a fledgling M.B.A. program. Write to: Dominic B. Perello, Coordinator of Economics, Business Administration Department, California State Polytechnic College, San Luis Obispo, California, 93401.

*Economist:* Small, four-year, coeducational liberal arts college, new and state supported, with continued growth and expanding academic programs, seeks Ph.D. in economics or doctoral candidate with firm commitment to finish work within an agreed-upon period of time. Teaching assignment flexible, but with emphasis on subject matters of public and private finance: money and banking, public finance, corporation finance, investments, insurance, accounting, quantitative economics. Rank, assistant or associate professor. Salary commensurate with education and experience. For further information, write and send résumé to: John E. Barthel, Chairman, Department of Economics, Asheville-Biltmore College, Asheville, North Carolina, 28801.

*Economists:* Permanent teaching positions in an expanding economics department. Openings in several fields of specialization. Ph.D. or near Ph.D. required. Salary, $9,500 and up for academic year. For further information, write and send résumé to: Phillip A. May, Department of Economics, School of Arts and Sciences, Northern Michigan University, Marquette, Michigan, 49855.

*Economists:* Ph.D. or Ph.D. candidates with backgrounds in fiscal policy, public finance, or quantitative methods required for September, 1968. Please send résumé to: Dr. Robert S. Rippey, Central Connecticut State College, New Britain, Connecticut, 06050.

*Dean, School of Business Administration and Economics:* California State College at Fullerton is seeking a qualified candidate to fill the position of dean of the School of Business Administration and Economics. The position requires a Ph.D. from a major university, experience in teaching, business, or government, and preferably administration at the college or university level. The salary range is from $17,200 to $20,903. Fullerton is approximately 25 miles southeast of Los Angeles. The college, now in its ninth year, has approximately 9,000 students and is scheduled to grow to 30,000 by 1980. The School of Business Administration and Economics, accredited

by the American Association of Collegiate Schools of Business, offers an undergraduate program, an M.B.A. and an M.A. in economics. Address inquiries to: Bernard L. Hyink, Vice-President, Academic Affairs, California State College at Fullerton, 800 North State College Boulevard, Fullerton, California, 92631.

*Business administration:* Michigan church-related (Methodist), four-year liberal arts college seeks M.A., M.B.A., Ph.D., or D.B.A. for teaching general business and marketing courses in 1968. Flexible course assignments, instructor, assistant or associate professor. Rank depending on applicant's qualifications. Beginning salary range $7,000-$10,000. Generous fringe benefits. P344

*Director of statistics and economic research:* The research and promotional instrumentality of the 15 Latin-American coffee-growing countries is seeking a qualified person to head up a 6-man department responsible for development, coordination, interpretation and communication of information relating to the growing, processing, marketing and consumption of coffee. Department activities are supplemented by regular use of outside consulting firms specializing in economics, market research and consumer research. Candidate must be a native Latin American and have a doctorate in one of the following: economics, marketing, chemistry, business, agronomy, or law. He would be located at New York City headquarters. Salary will be consistent with experience and qualifications plus liberal benefits. Write in confidence to: Julian C. Smith, Case and Company, Inc., Management Consultants, 600 Fifth Avenue, New York, New York, 10020.

*Assistant or associate professor:* Department of Commerce, commencing September, 1968. Ph.D. or D.B.A. completed or in progress in financial management, production management, or quantitative methods in business. Business experience desirable. Apply to: B. A. Robinson, Department of Commerce, Acadia University, Wolfville, Nova Scotia, Canada.

*Economist:* For one- or two-year teaching assignment in economics and/or business administration at one of the most progressing international universities. All lectures are in English. Ph.D. or D.B.A. and some teaching experience are required. Salary depends on qualifications, present rank, and experiences. The position may be permanent for Iranian citizens who meet the above qualifications. Contact: Dr. Manuchehr Vessal, Provost, Pahlavi University, Shiraz, Iran.

*Visiting professorship in economics, 1968-69:* Applications are invited from established economists in the U.S. and Canada for the year 1968-69 and/or 1969-70. Salary in the range of $10,000 to $12,000. Preference for a micro-macro theorist or econometrician but the preference is not an exclusive one. Further details readily available from: Professor E. T. Nevin, Department of Economics, University College of Wales, Aberystwyth, U.K.

*Operations research, economics:* Assistant professorship, teaching undergraduate economics and assisting in organizing a graduate program in marine transportation management. Salary range $7,500 to $14,000 for academic year. Appointment begins September 1. Write to: D. J. Duffy, Vice-President for Academic Affairs, State University of New York Maritime College, Fort Schuyler, New York, New York, 10465.

*Economists and regional planners:* The Maryland-National Capital Park and Planning Commission has challenging positions at various levels for economists and planners. The positions have a salary range of $10,303 to $13,914. The duties to be performed are: economic soundness analysis of regional and county plans; evaluation of current economic trends, projections of economic activity, and cost-benefit studies of various county and regional activities. The positions are located in Montgomery and Prince George's Counties of the Washington Metropolitan Area. Applicants for these positions should apply to; Hameed Naz, Chief, Research Division, or David K. Metzger, Personnel Officer, 8787 Georgia Avenue, Silver Spring, Maryland, 20907.

*Economist:* September, 1968. Principles, monetary theory and policy, senior seminar, and direction of major programs. Emphasis on teaching small classes. Instructor, assistant or associate professor. Ph.D. and teaching experience preferred. Rank and salary determined by qualifications. Generous fringe benefits. Write to: Professor Milan Hapala, Chairman, Department of Economics, Sweet Briar College, Sweet Briar, Virginia, 24595.

*Economist:* State college, 4,000 enrollment, in southern Oregon, has opening at assistant or associate level. Teaching assignment for 12-hour load each quarter term will include principles and one or two upper division courses to be selected. Extension and summer school teaching usually available. Ph.D. or near Ph.D. required. This four-year, liberal arts college is superbly located for fishing, hiking, hunting year-round, and skiing within one-half hour drive in winter. Send résumé to: Dr. Vaughn Bornet, Chairman, Social Sciences Division, Southern Oregon College, Ashland, Oregon, 97520.

*Economist:* Major integrated Northwest-based forest products company offers challenging position in its economic analysis department. Requirements include experience in general economic forecasting and background in pulp, paper, and/or packaging. Work encompasses situation and feasibility analyses, industry studies, consultation with divisional management. Highly regarded department with growing responsibilities and containing a diversity of specialized skills. Opportunities are abundant for professional advancement. Area considered most desirable for year-round living. Attractive salary and fringe benefits. Relocation expenses paid. Write to: Dr. L. M. Guss, Director, Marketing and Economic Research, Weyerhaeuser Company, Tacoma, Washington, 98401. An equal opportunity employer.

*Economist:* September, 1968. Ph.D. or close; interest in principles and at least one specialized area of economics; maximum two preparations per quarter; rank commensurate with qualifications; salary very competitive; dynamic, rapidly growing state college with master's program imminent, excellent opportunity in expanding five-man department. Send inquiries to: Dr. Eugene A. Philipps, Chairman, Economics Department, Moorhead State College, Moorhead, Minnesota, 56560.

*Economists:* Ph.D. Two vacancies for the academic year beginning September, 1968. One position is in the area of microeconomics or money and banking; other position in labor economics. Rank of assistant or associate professor; salary range from $10,500 to $13,700; generous benefits. Applications should be sent to: Dr. Aretas A. Dayton, Director of Division of Social Sciences, Eastern Washington State College, Cheney, Washington, 99004.

*Economist:* September, 1968. Ph.D. or substantial work toward doctorate. To teach principles plus three of the following: theory, development of economic thought, international economics, systems, public finance, econometrics. Instructor to associate professor. Salary $7,200 to $11,600 plus generous fringes. Church-related (Lutheran) college with strong liberal arts emphasis. Write to: Dr. Thomas E. Van Dahm, Chairman, Division of Business and Economics, Carthage College, Kenosha, Wisconsin, 53140.

*Applied economist:* For Paris-based, international research group. Senior position offering challenging assignments in national accounts analysis, forecasting of economic conditions, structural industry studies and market projections. Salary $8,500-$11,000 p.a., depending on qualifications and experience (minimum five years in relevant field; command of French or other European language). Send detailed résumé. P345

*Economic theory:* Large department (34 faculty) in new university, favorably located in Vancouver Metropolitan Area, with substantial graduate program in economics (both M.A. and Ph.D. level) seeks senior appointee (full professor) for theory area. Substantial academic experience and publication record required. Write to: Dr. Parzival Copes, Head, Department of Economics and Commerce, Simon Fraser University, Burnaby 2, British Columbia, Canada.

*Business administration:* Sizable new university, favorably located in the Vancouver Metropolitan area, invites applications at all rank levels. The department has substantial M.A. and Ph.D. programs in economics in operation; graduate program in business administration imminent. Applicants must possess doctorate (near doctorate for instructor rank). Additional specialists sought in accounting, finance, management, production, organization, and quantitative methods. For some (but not all) of the senior positions, administrative capabilities will be an asset. Write to: Dr. Parzival Copes, Head, Department of Economics and Commerce, Simon Fraser University, Burnaby 2, British Columbia, Canada.

· *Economics:* Expanding economics department has vacancies for the academic year beginning September, 1968, in the following areas: principles of economics, economic history, labor economics, international trade, statistics, mathematical economics. Salary and rank according to qualifications and experience. Applicants must possess strong interest in research and economic scholarship and be competent in teaching. Applications should be sent to: Dr. G. O. Rothney, Dean of Arts, Lakehead University, Port Arthur, Ontario, Canada.

*Economics:* Instructor or assistant professor. September, 1968. To teach undergraduate courses in statistics and macro and micro theory with a mathematical emphasis. An interest in labor or industrial organization would also be useful. Ph.D. or doctoral candidate preferred. It is possible to substitute the development of enlarged opportunities for undergraduates to participate in research in place of some teaching. Salary $9,000-$11,000 for assistant professor. Contact: Professor W. V. Williams, Chairman, Department of Economics, Hamline University, St. Paul, Minnesota, 55101.

*Economists:* An expanding, private research organization has openings for staff economists in Albuquerque, New Mexico, and Washington, D.C. The firm is engaged in economic, management, and behavioral science consulting work for various public and private organizations. Most projects are involved with urgent economic and social problems and usually are concerned with redirection of policy. Applicants are being considered at various levels; minimum requirements are a Ph.D. or an M.A. with research experience. Opportunities are available for qualified applicants with experience in economic analysis of social and urban problems, particularly health, welfare, education, manpower, and transportation. Experience in benefit-cost and related techniques of analysis in these areas and background in quantitative methods are desirable. Salary depends on qualifications and experience. Please write, including educational and employment résumé and references, to: Richard W. Kirschner, Kirschner Associates, Inc., 2440 San Mateo, N.E., Albuquerque, New Mexico, 87110.

*Economist:* September, 1968. One- to two-year teaching position available at four-year liberal arts college. Pending continued growth of enrollment, position will become permanent. Doctoral candidates and those with master's degrees will be considered. Prefer applicant with background emphasis in theory. Some managerial economics desirable but not required. Applicant would teach courses among the following: Principles, international economics, macro, micro, money and banking, and perhaps managerial economics the second year. The school offers majors in economics, business administration, and accounting. Rank and salary competitive. Please address correspondence to: Dr. Dale J. Shaw, Academic Dean, Jamestown College, Jamestown, North Dakota, 58401.

*Economist:* September, 1968. Rank at associate or full professor. Salary from $12,000 to $15,000, depending on qualifications and experience. Courses include principle and advanced levels, particularly international trade. Teaching load is 9 semester hours. Liberal fringe benefits. Please send résumé and credentials to: Dr. Mohamed El-Behairy, State University College at Buffalo, 1300 Elmwood Avenue, Buffalo, New York, 14222.

*Accounting and marketing:* Applications are requested for a two-year appointment, effective September 1, 1968, for the 1968-69 and 1969-70 academic years, to replace a department member on a leave of absence. The teaching load of 12 hours each semester will consist of one section of principles of marketing and three sections of elementary accounting. Applicants with the master's degree and no experience will be considered for appointment at the rank of instructor. Further graduate work and experience may qualify an applicant for appointment at the rank of assistant professor. Write to: Dr. William F. Railing, Chairman, Department of Economics and Business Administration, Gettysburg College, Gettysburg, Pennsylvania, 17325.

*Chairman:* University of Toledo, now a state university with current enrollment of approximately 12,000 and rapidly growing, situated on a 150 acre campus in a private residential neighborhood. Economics Department expanding from 8 to 11 full-time members. This M.A. program well established, with Ph.D. program antici-

pated. Department seeks a man with administrative experience and leadership ability for chairmanship. Salary of approximately $20,000 (plus generous fringe benefits) for 9-month academic year. Additional compensation for summer employment. Write to: Dean S. J. Kaplan, College of Arts and Sciences, University of Toledo, Toledo, Ohio, 43606.

*Economists:* Ph.D. or near (instructor to department chairmanships). Salaries from $7,500 to $22,000 according to qualifications. Appointments beginning September, 1968, to teach all areas of economics in liberal arts college and universities located throughout the country. A free service. P346

## Economists Available for Positions
### (Italics indicate fields of specialization)

*Economic theory, economic history, labor economics, money and banking:* Man, 32, Indian; M.A., working towards Ph.D. at Calcutta University. Trained in labor welfare; 7 years of graduate and undergraduate teaching experience; several publications. Desires teaching or research position. E1658

*Industrial relations and personnel management, economic planning, economic history:* Man, 32, married; M.A. Assistant director of compensation service; 7 years of federal civil service; 3 years of teaching experience. Many articles in foreign field; fluency in Italian and other Romance languages; wide contacts, including business executives, labor representatives, and federal officials. Desires writing or college teaching position. E1666

*Land and area development:* Man; A.B., M.S., all college and professional honors. Nationally recognized; 35 years of high-level professional experience. Independent consulting economist in Washington, D.C., with own office for 25 years. Over 300 studies made in most economic fields, both in U.S. and abroad. Knowledge of Spanish, Italian; some knowledge of French and German. Desires additional assignments on contract, per diem, or retainer basis. Résumé furnished on request. E1669

*Microeconomics, economic development, international economics, money and banking, economic planning and public administration:* Man, 27; B.A., M.A., Dr.rer.pol. in 1967 (West Germany). Doctoral research carried out in the pure theory of international trade with special reference to development problems. Desires research, academic, or teaching position in United States or Canada. Available on short notice. E1677

*Labor economics, management, principles of economics, money and banking, statistics:* Man, 53, married; Ph.D. Eighteen years of college and university teaching experience, including 3 years as department chairman; 9 years of personnel work in industry and government. Midwest only; prefers Missouri or Illinois. Available in September, 1968. E1681

*Economic problems of underdeveloped areas, international public and business finance, investment and accounting:* Man, 44, Indian (Goan), married, with Western education and background; B.S.C. (Econ.) from European university, Ph.D. dissertation in underdeveloped country economics in progress, preparing for final professional accountancy examination. Twenty years of extensive experience in senior financial position in national transport undertaking in East Africa, 8 of which as officer in charge; employed since May, 1965, as auditor in U.S. government agency; business experience includes administrative as finance and accounts department head of moderate sized undertaking. Paper on population growth in underdeveloped country published. Extensive travel in Europe, Asia, and Africa. Excellent references. Seeks research, operational or administrative position with research organization, financial institution or business undertaking in U.S., Canada, or Europe. Prefers position offering creative challenge. Available in September, 1968. E1688

*Economics:* Man, Indo-Pakistani, 33; M.A. Hons. (economic science), B.Com., B.Sc., A.C.C.S. Several years of teaching experience at various levels; chairman, department of commerce at a school. Desires teaching and/or research position at school or college level, preferably in a state with warm climate. Available any time at six-month notice E1693

*Economics, public finance, taxation, law, government and business:* Mature man, married; B.A., M.A. (economics), LL.B. Twelve years of full-time teaching of economics and business courses. Strong in law, economics, income and estate taxation, public finance, government and business. Bilingual, Spanish-English. Experience in government, law and business. Résumé sent upon request. Available in June or September, 1968.                                      E1711

*Labor, public finance, money and banking:* Man, 45, married; Ph.D. Twelve years of teaching experience. Prefers college with accent on good teaching rather than publications. Prefers western area of country and associate professor rank.          E1712

*Microeconomics, history of economic thought, economic history:* Man, 35; M.B.A., Harvard, Ph.D., Columbia (economics). Four years of experience in financial departments of major U.S. corporations; 4 years of experience as an instructor and assistant professor of economics. Some publications. Research interests in human organization of "the firm." Desires research, consulting, and/or teaching position located in eastern Canada or U.S. Available in July, 1968.                E1715

*Public finance and fiscal policy, macroeconomic theory, economic growth, transportation economics:* Man, 41, married; Ph.D. Fifteen years of teaching experience at both graduate and undergraduate levels; 10 years of experience in business consulting. Experienced in administration. Seeks dynamic academic challenge with administrative responsibilities in economic and/or business administration. Available in August, 1968.                                              E1716

*Principles of economics, business cycles, economic growth, Latin-American economic problems, industrial organization, marketing, human relations in industry, community development:* Man, 33, married; B.A., M.A., Ph.D. Substantial publications. Two years of teaching experience in an American university; worked with international organizations. Currently employed as a consultant in a land colonization project in a Latin-American country. Desires overseas teaching, research, or consulting position. Available in January, 1968.                              E1718

*Economic theory (micro and macro), econometrics, economic thought, growth and development, international economics, monetary theory, money and banking, economic systems:* Man, 48. Fifteen years of teaching experience at graduate and undergraduate levels; modest publication. Desires relocation in a progressive institution.                                                        E1721

*Eastern European economics, comparative economic systems, international economics, business:* Man, 38, married; A.B., completing M.A. (economics). Broad experience (15 years) in business administration. Seeks stimulating position. Available in June, 1968.                                                          E1725

*Economic development, industrial economics, operations research, econometrics:* Man, 39, Indian, now in U.S. with permanent resident status; Ph.D. (economics) from leading American university. Eleven years of research experience in government and business; modest publication record. Seeks position in research, business, or consulting in U.S. or Canada. Available in 1968.                      E1726

*Macroeconomics, national accounting systems, money and banking, international finance, government finance, comparative systems:* Man, 46; Ph.D. Management experience; 8 years of teaching; modest publications; several fellowships and grants. Seeks challenging position. Metropolitan center or near such in East preferred.
                                                                E1727

*Principles, public finance, money and banking, taxation:* Man, 49, single; Ph.D. Fifteen years of college and university teaching experience. Desires position beginning in January, 1968.                                           E1729

*Monetary theory, macroeconomics, microeconomics, money and banking, international economics, principles:* Man, 26, married; Ph.D. Fulbright Scholar. Excellent references. Minor publications. Two years of teaching experience in a U.S. college; now lecturer in a British university. Seeks position in a significant and stimulating university or college. Prefers northern U.S. but location of secondary importance. Available in September, 1968, or January, 1969.                      E1731

*Industrial organization, macro and micro theory, public finance, economic develop-
ment:* Man, 29, married; A.B., M.A. (economics), partial completion of requirements
for Ph.D. at major university. Good academic record; teaching assistant in graduate
course. Research experience in business and government. Currently working as a
program budget analyst in resources for legislature of major state. Interested in
college teaching at small liberal arts college. Available in June, 1968.　　E1732

*General business, marketing, economics:* Man, 38, married; B.A., M.A., Boston
University. Eleven years of business experience in administration, purchasing, ad-
vertising, budgets, forecasting. Special interests in real estate and construction.
Desires challenging position in economic research and possible future teaching
opportunity. Prefers northeast U.S. location. Available in April, 1968.　　E1733

*Principles, public finance, money and banking, history of economic thought:* Man,
Ph.D. Sixteen years of college and university teaching experience. Research interest
is in cost-productivity relationships in higher education. Publication soon. Desires
relocation in institution stressing good teaching.　　E1736

*Economic principles, labor problems and legislation, development of economic
thought:* Man; Ph.D. large eastern university. Fourteen years of teaching experi-
ence; excellent references. Seeks teaching position in the New York City-New
Jersey metropolitan area for September, 1968.　　E1737

*Economics, international trade, political science:* Man, 40, foreigner; B.A. in eco-
nomics and political science, M.A. in philosophy (English and French). Twelve
years of government experience in foreign trade, economics, administration, and
politics. Speaks several languages. Seeks suitable position in private business, re-
search institution, or international organization. Available in 1968.　　E1742

*International economics, industrial organization, microeconomics, history of eco-
nomic thought:* Man, 44, married; B.A., M.A., Ph.D. from top eastern university.
Presently teaching in liberal arts college on West Coast. Publications, including
one book. Desires teaching position in other college or university. Available in
September, 1968.　　E1745

*Micro and macro theory, growth and development, comparative systems, business
cycles, international economics, money and banking:* Man, 35, married, Indian
citizen and U.S. permanent resident; B.A. (commerce), M.A., Ph.D. Presently as-
sociate professor; 8 years of university teaching experience at the undergraduate and
graduate levels; fellowships; modest publication record; administrative experience.
Desires relocation to a teaching and/or research position; overseas appointments
not ruled out. Available in September, 1968.　　E1747

*Money and banking, public finance, principles, business cycle analysis, development
theory:* Man, 27, married; M.S., Ph.D. course work completed and now working on
dissertation. Graduate teaching assistant, 1963-64; National Science Foundation
Graduate Fellow, 1964-66; full-time teaching, 1966-67; part-time to work on dis-
sertation, 1967-68. Desires position in teaching or in research (principally in money
and banking or public finance) or a banking post, September, 1968.　　E1750

*Accounting, economics, marketing:* Man, 57, married; M.B.A., Harvard. Sixteen years
of college and university teaching experience; also experience in business and govern-
ment. Seeks teaching position at college or university with strong dpartment of
business administration. Available in fall, 1968.　　E1751

*Principles, economic development:* Man, 51, married; LL.D. and Pol.Econ. and
Soc. Sci. D., plus 30 semester hours in economics. Seven years of experience in teach-
ing. Desires any position at or near a university that would make possible completion
of doctorate in economics.　　E1752

*Economic theory, economic development, international economics, quantitative and
mathematical economics:* Man, mid-40's; degrees from Chicago. Phi Beta Kappa.
Academic and nonacademic experience. Numerous publications in quality journals,
including book, articles, and reviews. Former staff member, University of London.
Interest in Latin America; fluency in Spanish, read, speak, and write. Looking for
affable and stimulating intellectual environment.　　E1753

*Statistics, mathematical economics, international economics, money and banking, public finance, micro- and macroeconomics, comparative economic systems, history of economic thought, business cycle:* Man, 29, married; B.A. and M.A. in economics, Ph.D. dissertation well under way. Two years of research experience; 2 years of teaching experience (principles and statistics). Seeks research and/or teaching position in North or West Coast of U.S. or Canada.                                     E1754


*Money and banking, monetary theory, macroeconomic theory, business cycles and forecasting, history of economic thought:* Man, 40, married; B.A., M.A., currently working on Ph.D. thesis. Seven years of college teaching; 3 years of economic and statistical research; publication; fellowships and grants. Prefers post with M.A. program. Available in June or September, 1968.                                     E1755


*Management science, business information systems, economics, computer technology:* Man, 30, married; B.B.A., C.C.N.Y. (production), M.B.A., University of Chicago (production, statistics), Ph.D., University of Pennsylvania (business organization and operations) will be received in June, 1968. United States Steel Fellow, 1962-63 and 1963-64. Three years of full-time college teaching experience in statistics, economics, quality and production control. Elected "Teacher-of-the-Year," 1965-66. Four years of business and consulting experience. Prefers New England but would consider other locations. Seeks teaching/research position at intellectually demanding college or university. Available in June or September, 1968.                                     E1756


*Economic development, international economics, agricultural development in low-income countries, agricultural economics, microeconomics, marketing, statistics:* Man, 50, married; M.S., Iowa State University, M.A., Ph.D., Harvard University. Permanent contract since 1951 with Food and Agriculture Organization of the United Nations, presently on leave in United States to finish manuscript on a case study in agricultural development for publication and visiting professor at large eastern state university. Interested in relocation in the United States. Fluent in Spanish, Italian, French, and German. Seeks challenging teaching or teaching and research position at college or university or research, administrative, or consulting position in international field with private or public agency. Comprehensive publication list. Available in June, 1968.                                     E1757


*Econometrics, statistics, economic theory, history of economic thought, economic development:* Man, 24, married; B.A., M.A., Queens College, City University of New York, Ph.D. candidate. Three years of diversified teaching experience; presently teaching 12 hours. Seeks position near or within New York Metropolitan Area or Long Island. Available in September, 1968.                                     E1758


*Economic theory and principles, agricultural economics, history of economic thought, statistics, managerial economics, industrial organization:* Man, 25, married; A.B., M.B.A., Ph.D. comprehensives to be taken in June, 1968. Business, research, and university teaching experience. Seeks teaching position in United States, September, 1968.                                     E1759


*Transportation, public utilities, statistics:* Man, 55, married; Ph.D. Phi Beta Kappa. Thirty years of experience as government economist performing and directing transportation research (air, truck, rail, and water); and as expert witness in administrative proceedings; 18 years of part-time college teaching of courses in transportation, public utilities, statistics. Desires position as director of research and/or witness with private firm or state or local government, teaching, research or administration with university. Prefers Washington, D.C., area. Available immediately.  E1760


*Managerial economics, corporate finance, capital budgeting, economic and financial analysis:* Man, 25, single; Honors B.S. in chemistry, Ivy League, M.B.A. in economics. Substantial capability in French and Italian. Experience in economic and management consulting, writing for publication, and tutoring. Seeks position outside the U.S. in teaching, consulting, or industry. Available in September, 1968.  E1761

*Macro- and microeconomics, history of economic thought, international economics, money and banking, public finance, Indian economics:* Woman, 40, married; Ph.D. from American university, 1964. Six years of teaching experience. Presently teaching undergraduate and graduate classes in Delhi University, India. Desires university teaching position in U.S. Available in August, 1968.　　　　　　　　　E1762

*International economics and finance, economic development, finance of enterprise in Latin America:* Man, 38, married; Ph.D. Ten years of college and university teaching experience; 2 years in central banking related to Latin America. Several years as director. program of research in economics and finance, Latin-American area, for U.S. corporation. Travel in academic, official and business capacities, including research fellowship. Proficient in Spanish and Portuguese. Seeks teaching and research position.　　　　　　　　　　　　　　　　　　　E1763

*Economic systems and thoughts, international trade and development, macroeconomics:* Man, 38, married; Ph.D. in 1959 and some postdoctoral work. Eleven years of teaching and 3 years of administrative experience. One publication in 1967 and another in process. Seeks teaching or administrative position.　　　　E1764

*Principles, money and banking, corporation finance, transportation:* Man, single; Ph.D. University teaching and research experience. Publications. Prefers teaching and research.　　　　　　　　　　　　　　　　　　　　　　　E1765

*Finance, management, mathematics, quantitative methods in decision making:* Man, married; Ph.D. in business administration, undergraduate training in chemistry and mathematics. Diversified teaching experience; experience in teaching adults beyond the college age; business experience as business manager, chemical purchasing agent, and management consultant; currently professor and chairman of business division. Desires teaching and/or administrative position at undergraduate or graduate level; would also be interested in industrial position in management development and long-range planning.　　　　　　　　　　　　　　　　　　E1766

*Macro- and microeconomic theory, international economics, money and banking, business cycles:* Man; B.A., M.A., Ph.D. in 1960. Seven years of full-time teaching of various university economics courses. Ford Foundation Research Fellowship; modest publication record; presently associate professor in a state university. Desires a change in geographical location.　　　　　　　　　　　　　E1767

*Insurance, economics:* Man, 31, married; B.S. in Business Administration (major in insurance). M.A. in Economics, start work on Ph.D. when located. Seven years of good business experience with extensive knowledge of the insurance industry. Strong desire to teach; location and salary open.　　　　　　　　　　　E1768

*Regional economic development, micro and macro theory, agricultural economics, economic policy:* Man, 26, married; A.B., M.S., currently working on Ph.D. dissertation. Four years of research experience. Seeks teaching position with university or liberal arts college in Midwest. Available in September, 1968.　　　E1769

*Micro- and macroeconomics, economic development:* Man, 30, married; A.B. plus 31 graduate hours, Illinois Institute of Technology and University of Santa Clara. Six years of experience teaching on secondary level, plus preparation of economic curriculum for Chicago Archdiocesan Secondary Schools through D.E.E.P. program. Seeks employment in development or related fields. Available in June, 1968. Mr. David D. Pliska, 626 Belleforte, Oak Park, Illinois, 60301.

*Labor, industrial relations, collective bargaining, wage theory, labor legislation, personnel administration, organizational and human behavior theories, macro- and microeconomic theory, history of economic thought:* Man; Ph.D., Ivy League. Desires teaching and research, publication in order.　　　　　　　　　　　E1771

*Comparative economic systems, money and banking, history of economic thought, principles, investments, insurance:* Man, 35; M.A. plus 30 hours toward Ph.D. in economics. Two years of teaching experience. Desires position in or near New York City.　　　　　　　　　　　　　　　　　　　　　　　E1772

*Consumer economics, principles, money and banking:* Woman, 43, married; Ph.D. Sixteen years of college and university teaching experience. Prefers western area of country.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　E1773

*Money and banking, price theory, introductory micro and macro:* Man, 26, single; M.S. Three years of teaching experience. Desires teaching position.　　　　E1774

*Micro- and macroeconomics, money and banking, managerial economics, econometrics, mathematical economics, statistics, economic doctrines, international economics:* Man, 34, married; M.A., M.Litt., M.S., Ph.D. Five years of teaching experience; 6 years of research experience. Prize winner; several publications; presently associate professor. Seeks teaching, research and/or administrative position. Prefers East, West, or Midwest. Available in June or September, 1968.　　　　　　　　　　　E1775

*Corporation finance, investments, money and banking, economic theory, insurance:* Man, 37, married; B.A., M.B.A., Ph.D. in economics and business administration, defense of dissertation tentatively scheduled for early spring. Four years of university teaching experience, including some graduate courses in finance. Desires teaching and/or research position. Will relocate for improved teaching and research environment in or near a metropolitan center. Available in September, 1968.　　E1776

*Economic theory, monetary theory, fiscal policy, economic history:* Woman, 30, single; B.B.A. (marketing), M.B.A. (economics), Ph.D. (economics) dissertation in progress. Presently doing regional research and tax study; 2 years of research experience; teaching experience as graduate assistant; publications. Prefers South or Southwest. Available in September, 1968, for teaching and/or research.　　E1777

*Economic theory, economic development, international trade:* Man, 31, married; M.A. (economics), University of California. Seven years with nonprofit and profit organizations in economic analysis and systems analysis. Currently employed with major university in systems analysis. Desires research, development planning, or administrative position in South America.　　　　　　　　　　　　　　　E1778

*Econometrics, scientific methodology, comparative economic systems, microeconomics, area studies:* Man, 38; B.B.A., M.A. (economics), Ph.D. (economics and philosophy). Advanced original work in mathematical logic; advanced logical model applications. Director, international consulting firm; 10 years of top U.S. university teaching experience; 10 years of top international business experience. Several foremost foundation awards; publications; fluency in several languages. Presently chairman of department at a graduate school. Desires a teaching, administrative, or research position in New York, Washington, D.C., New England, or internationally. Available early in 1968.　　　　　　　　　　　　　　　　　　　E1779

*Macro- and microeconomics, economic development, history of economic thought:* Man, 35, married; Ph.D. Five years of college teaching experience at both the graduate and undergraduate level. Presently employed by the Agency for International Development. Limited publication record. Prefers teaching and research position with graduate program. Available in September, 1968.　　　　　　　　E1780

*International economics, economic development, history of economic thought, theory, statistics:* Man, 47, married; doctorate in a related field and course work and written qualifying examination completed for an additional doctorate in economics. Varied experience, including 5 years of teaching and 3½ as economist with a United Nations agency in Africa, Middle East, and Europe. Seeks teaching position. Present rank associate professor and department chairman.　　　　　　　E1781

*International economics, comparative economic systems, economic thought, economic history, development of capitalism:* Man; Ph.D. Unusual and broad experience and direct involvement in economic and social analyses and/or development of a series of foreign countries, with excellent personal and professional relations in all European countries and a fine teaching experience in the U.S.; fluent in several foreign languages. Looking for a leading position, teaching and/or research, with an important university or research organization, especially with institutions directly interested in developing of a joint Atlantic research institute or international relations and development.　　　　　　　　　　　　　　　　　　　　　　　E1782

*Economic consulting in Brazil:* Man, 38, married; native Brazilian; B.A. and gradu-
ate courses in economics from two well-known universities in the U.S. Ten years
of business experience in Brazil and 6 years in the U.S.; due to return to Brazil by
the end of 1968. Seeks firms or organizations interested in consulting and/or repre-
sentation in Brazil on a part-time, fee basis. Résumé furnished on request.    E1783

*International development, trade and finance, business cycles and forecasting, busi-
ness and economic statistics and research, macroeconomics:* Man, 59; D.C.S. Wide
experience in university teaching and direction of research and in government
service, latter including 9 years (1959 to date) of foreign service as economic ad-
viser, development planning, in L.A. and Near East countries. Will accept a suitable
university position in teaching and/or research or a responsible position in an
organization engaged in consulting and research work in the area of economic
development.    E1784

*Economics of developing areas, international economics, economic thought, resource
economics, agricultural policy:* Man, 31, married, Indian national; Ph.D. from a
U.S. university. Currently assistant professor at a U.S. state university. Several
research papers and publications in U.S. and Indian journals. Nearly 6 years of
research experience and 2 years of teaching experience. Recipient of two national
fellowships. Wishes to relocate. Seeks teaching and/or research position with uni-
versity. Available in September, 1968.    E1785

*Economic theory, fiscal and monetary analysis, national income accounting, corporate
finance, industrial organization and marketing, labor economics, area studies, inter-
national and developmental economics:* Man, 43; Ph.D. in economics, major uni-
versity. Foundation and university fellowships; 20 years of experience in govern-
ment, university teaching, business research, and private consulting for many clients.
Publications. Seeks part-time or temporary full-time economic consulting. Willing to
travel.    E1786

*Principles, micro- and macroeconomics, finance, business economics, money and
banking:* Man, 23, married; B.A. (business), M.A. (economics), additional work
toward Ph.D. College teaching experience; fellowships. Seeking teaching position
with liberal arts institution where emphasis is on teaching. Will consider other areas
in addition to those above. Available in June or September, 1968.    E1787

*Microeconomics, statistics, industrial organization:* Man, 30, married; A.B., M.A.
(economics), all requirements except dissertation completed toward Ph.D. in
economics. Five years of college teaching. Will consider teaching and/or research
position.    E1788

*International economics, labor economics, economic development, price theory:*
Man, 40, single, Jordanian with permanent residence in Canada; License in Law,
License in Economics, Doctor in Economics, Geneva University. Publications, several
papers; presently associate professor in French Canadian university. Desires teaching
position or research possibilities. Available in May, 1968.    E1789

*International finance, public finance and fiscal policy, economics of welfare, national
income accounting, economic development, regional economics:* Man, 39, married;
M.A., additional work towards Ph.D. Fellowships; languages; 10 years of progressive
research experience; publications. Seeks research position. Willing to relocate.
    E1790

*Money and banking, international economics, economic development, economic
thought, microeconomics:* Man, 55, married; Ph.D., Wisconsin. Twenty years of
teaching experience at the college level; chairman of economics department in liberal
arts college; widely traveled in Europe; linguistic ability. Wishes to relocate at
another liberal arts college. Available in September, 1968.    E1791

*International economics, banking and monetary theory, economic development:* Man,
over 40, Korean; B.A., M.A., Ph.D. prominent institutions in U.S. Research experi-
ence as economist with a bank; 7 years of teaching experience as member of economics
department; extensive publications in English; excellent references from well-known
American economists. Seeks teaching position or appointment with business firm
interested in research in Far Eastern affairs. Available in September, 1968.    E1792

I. *Articles*

II. *Reviews*

III. *Notes*

*Volume XVI, No. 1, November, 1967*

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**AN INTRODUCTION TO THE AMERICAN ECONOMY**: Analysis and Policy
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Jess Witchel, The City College, City University of New York

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# business & economics

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Donald L. Shawver, University of Missouri

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Charles W. Hultman, University of Kentucky
Lazzlo Zsoldos, University of Delaware

This text presents a balanced, concise study of the international finance field. The authors describe and analyze the institutions of international finance; explain their operations and functions; outline the nature, use, and significance of its procedures and instruments, and present theoretical aspects of the subject in relation to practice. 1963. 352 pages. $7.75.

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March 1968                              688 pp.                              $9.95

*And its supplementary materials . . .*

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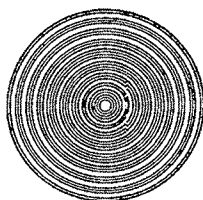
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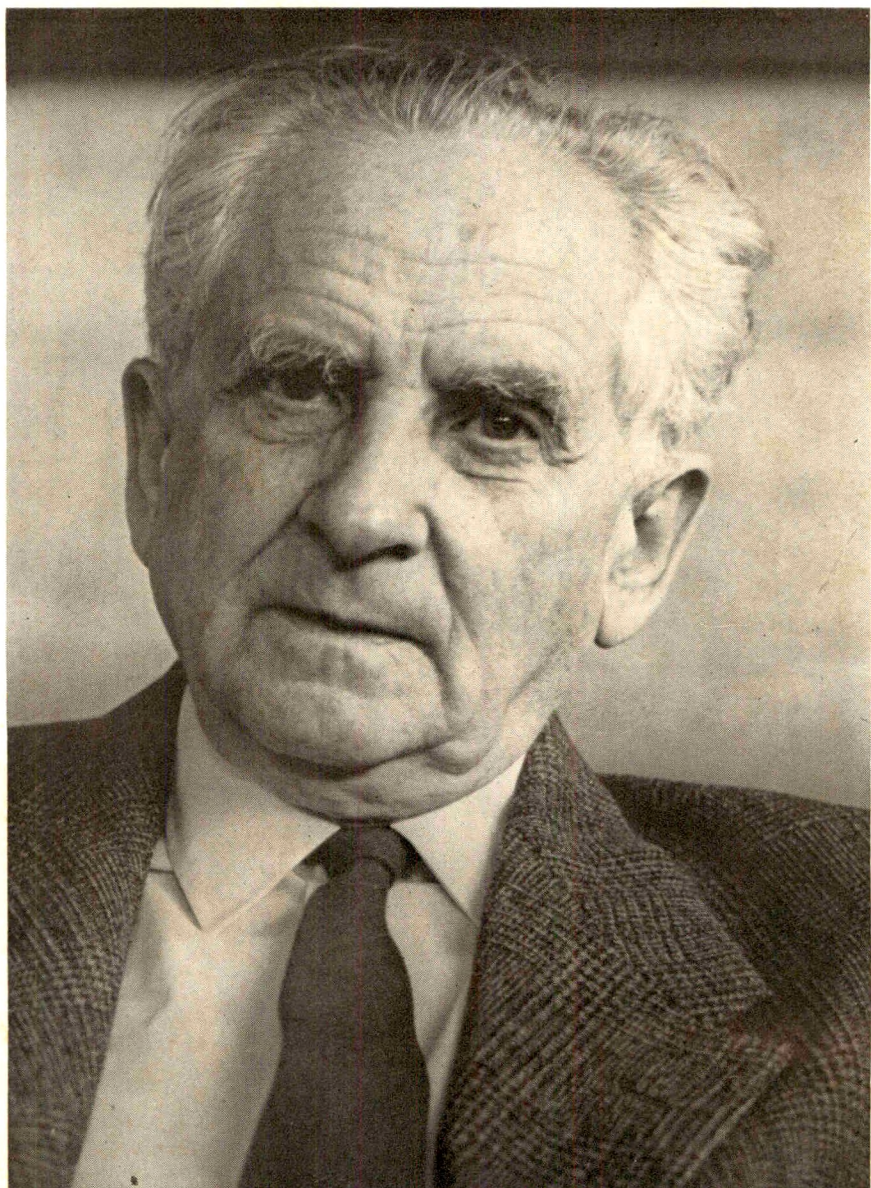
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### By Louis Lefeber*

In a planned economy where decision making is at least partially decentralized, the coordination of the diverse production and investment decisions with the aggregate national development plan is a fundamental problem of planning. In particular, if the free market prices are inconsistent with the social goals, the market-determined outputs of goods and services and the division of effort between production for current and future consumption will be less than socially optimal. This is obviously the case if the conditions for competitive pricing are not satisfied, i.e., if there are increasing returns to scale in production or certain externalities and imperfections whose effects on pricing are not corrected by government intervention. But even if all the necessary conditions are met, it is well known that pure competition will still not lead to a socially optimal resource use if the distribution of income is not socially optimal. This is likely to be the case in a labor surplus economy in which the supply of labor is infinitely elastic at institutionally determined minimum wage rates.[1]

[1] There is a growing body of literature on the welfare analysis of labor surplus economies. Here Sen's contribution [12] should be mentioned, as well as Marglin's recent monograph [8] which provides, in addition to an exhaustive discussion of the literature, an advanced analysis of optimal growth in labor surplus economies. Both Sen and Marglin confine their analysis, however, to one-sector economies which limits the generality of their policy conclusions. This is significant, because—as will be shown below—relative sectoral factor intensities can have an important and occasionally decisive role in the conduct of wage and employment policies. A multisectoral analysis is presented in Lefeber and Chakravarty [5] which is, however, confined—at the cost of excluding other welfare alternatives—to the derivation of time-minimizing routes to full employment.

The method of income redistribution suggested by neoclassical economics consists of a neutral personal tax-subsidy scheme, i.e., a direct transfer of purchasing power among individuals. But even apart from the problem of neutrality, such schemes cannot be relevant if no institutional means exist for their implementation as is typically the case in underdeveloped surplus labor economies. There the most important if not the only means of redistribution may consist of increasing the rate of employment.

If a positive wage rate is fixed in an unemployment economy but markets are otherwise free to adjust, competitive free market hiring will be carried to the point where the value of labor's marginal product is equal to the given wage rate. Then, if profit maximization is undertaken for the purpose of generating the largest feasible investable surpluses, the competitive free market process leads to the fastest attainable rate of economic growth. In the process unemployment is absorbed as fast as possible, but current employment is restricted to just that level needed to stay on the maximal growth path.[2] In this case consumption is only an intermediate activity with the function of physically sustaining the labor engaged in producing for the future. It can be shown, however, that if society values redistributed current consumption also per se, competitive free market processes result in a lower rate of employment and a higher rate of investment relative to current consumption than justifiable on social welfare grounds. Furthermore, if it is the rate of investment which is being held constant and the institutional wage rate is a policy parameter, a higher rate of employment and consumption may be attained by a planned and controlled allocation of resources than by market competition.

Two points need to be mentioned. First, for the attainment of a welfare optimum, intervention in the market process may be necessary. This is so because in the short run, when the stock of other resources is fixed, raising employment above its competitive free market level necessarily lowers labor's marginal product from equality to below the fixed wage rate. Hence, profit maximizing entrepreneurs can be induced to exceed the free rate of hiring only if the difference is made up to them by a suitable payroll subsidy. Second, since an induced increase in the current level of redistributed consumption may result in lowering the rate of investment and, consequently, the rate of growth of employment and consumption, each form of intervention—as well as non-intervention—implies a social judgment about the desired balance between current and future welfare.

These observations give a clue as to what types of models are suitable for planning in surplus labor economies. First, since the current level

[2] See Lefeber and Chakravarty [5].

and the rate of growth of employment are of central welfare interest, the model structure must explicitly recognize the relationship between employment, consumption, and growth. Second, if the model is expected to yield, along with a plan, policies for decentralized implementation, the family of alternative plans which can be generated by the model must also include the free market solution.[3] Only in that case can the differences between the price structure associated with the latter and the desired welfare optimum be directly observed and the decentralized means for sustaining a nonmarket solution deduced. Third, the alternative plans must be derived in response to clearly stated relative preferences as to current and future welfare. These can be incorporated into a social welfare function which in the simplest case reduces to a set of relative weights for consumption and investments.[4] In any case, the price relationships from which policies for plan implementation are deduced must be functions of relative social preferences.

At one extreme, it is conceivable that no weight would be placed on growth so that current consumption would be maximized. This necessarily implies stagnation either in absolute or in per capita terms.[5] At the other extreme there is the already mentioned possibility of wanting to maximize the growth of consumption or employment without concern for temporal welfare.[6] It is more than likely, however, that social preferences—whatever they may be—will lie between these extremes.[7] Hence, any model to be used for planning should have the corresponding capacity of generating all relevant intermediate solutions.

## I. *The General Argument*

In this discussion, a state of surplus labor is said to exist when (1) given any wage rate, there is an incipient redundancy of labor; or (2)

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[3] Hence, the planning model must be of the optimizing type. However, optimization alone does not insure the existence of a free market analogue. This depends on the structure of the model, i.e., the specification of the objective function and other constraints. For instance, models whose objective functions include certain strategic variables (e.g., foreign investment) or have arbitrarily specified growth rates during the plan or in the post-terminal period, cannot generate solutions which represent free market analogues.

[4] The general form of social welfare function should have as its arguments both the absolute levels and the rates of change of the relevant variables. However, in the context of planning the substitution of the rate of investment for the different growth rates may be defensible not only on pragmatic grounds but also in terms of the analytical structure underlying most planning models. Specifically, if investment and capital stock are homogeneous, the substitution of the rate of investment for particular growth rates in the social welfare function leaves steady state growth solutions unaffected.

[5] If the objective is the maximization of some present discounted value concept of consumption, it can lead to growth only to the extent that the productivity of investment exceeds the discount rate (see Chakravarty [1]). Then growth may have to be forced by constraints to obtain minimum rates of increase, as in Chakravarty and Lefeber [2] and in Eckaus [4].

[6] See Lefeber and Chakravarty [5].

[7] See Marglin [8] who forcefully makes this point.

given a particular institutionally determined wage rate, full employ-
ment cannot be attained by competitive *free* market processes.[8] Both of
these definitions are consistent with the classical Marx-Lewis concept
of an infinitely elastic labor supply at a given minimum wage rate.[9]
Furthermore, both refer to a short-run state: in either of the cases full
employment may be attained in the long run if the rate at which un-
employment is absorbed exceeds the rate of growth of the labor force.
The second definition is the more interesting, however, since it does not
exclude the possibility that government intervention in free market
processes may establish full employment even in the short run. For this
reason, unless otherwise indicated, I shall always discuss the broader
case covered by the second definition.

In such an economy let us assume that two goods, investment ($I$)
and consumption ($C$), are produced by labor ($L$) and capital ($K$) which
at the initial time period are available in given fixed quantities and that
the institutionally given real wage rate ($\bar{w}$) is specified in terms of the
consumer good.[10] Let us further assume that consumption by rent
earners is included in $\bar{w}$ in the form of a surplus of given fixed proportion
and that labor does not save from its wage income.[11] In this way profits,
already net of consumption, can automatically flow into savings and
with $\bar{w}$ given the minimum amount of $C$ produced in the economy is
determined by the rate of employment ($E$).

Now the economy can be described by the following relationships:

(1) $$I = F(K_I, L_I);$$

(2) $$C = f(K_C, L_C);$$

(3) $$\bar{w}(L_I + L_C) = \bar{w}E \leqq C;$$

(4) $$K_I + K_C = K(t);$$

(5) $$L_I + L_C = E \leqq L(t) = L_0 e^{nt}.$$

Relationships (1) and (2) are the production functions; (3) states that
the output of $C$ cannot be less than the wage demand for consumer
goods; (4) and (5) show the distribution of capital and labor between

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[8] This definition does not preclude certain potential ambiguities which will be clarified in
the analysis.

[9] Arthur Lewis [6] was the first to introduce, after Marx, the concept of an infinitely elastic
labor supply. For a neoclassical analysis of Marx-like systems see P. A. Samuelson [11].

[10] I shall assume throughout the analysis that production is subject to the law of constant
returns to scale. However, the argument in Part I—except the analysis of growth—would
remain unaffected if diminishing returns were to be assumed.

[11] I.e., consumption by capitalists is a function of employment. Alternatively, capitalists'
consumption could be made proportional to the total amount of capital in use, so that profits
would again represent a figure already net of consumption. The more neoclassical assumption
that capitalists' consumption is a function of profits may or may not be more realistic, but in
either case, it would interfere with the simplicity of the analysis.

the two processes at time $t$. It is reasonable to assume that capital is scarce, hence (4) will always be binding; however, (5) leaves open the possibility that total employment $E$ could be smaller than the potential labor force $L$ which is growing at the rate $n$. If at the given wage rate $\bar{w}$ the supply of labor is infinitely elastic, (5) must be an inequality by definition.

To be sure, the above relationships do not provide a basis for the selection of the desirable output combination; however, for any stipulated $\bar{w}$, the alternatives open to society can be derived. To this end different outputs of $C$ can be held constant and to each the corresponding highest feasible output of $I$ can be computed from relationships (1) to (5). On the other hand, if the weights society places on current consumption and investment can be identified, the socially optimal output combination and the corresponding resource allocation can be directly deduced. Assume—as it will be shown below—that such weights can be identified and are denoted by $P_C$ and $P_I$. In that case the weighted sum of the outputs (net national product valued at welfare prices) can be written as

$$(6) \qquad\qquad Y = P_C C + P_I I,$$

which, if maximized subject to the constraints (1) to (5), yields at any given moment of time the optimal values of $C$ and $I$.[12] By varying the weights all alternative maximal output combinations can also be obtained so that the temporal alternatives open to society can be derived by this method also. The resulting relationship is the production possibility frontier between $C$ and $I$ which can be written as

$$(7) \qquad\qquad I = I(C; \bar{w}),$$

and will be referred to as the *feasibility function specific to* $\bar{w}$ or $FF\bar{w}$. Since $\bar{w}$ is a parameter subject to arbitrary choice, (7) represents a family of production possibility functions, one for each institutional wage rate. The question is then: how do the members of this one-parameter family of feasibility functions relate to each other? It can be shown without any formal argument that all of them are bounded by a transformation function which is derived *as if* the wage rate were determined by free market competition and not institutionally specified.

### 1. The Social Transformation Function (STF)

If society were not to fix an institutional wage rate (i.e., $\bar{w}=0$), then (3) would naturally remain nonbinding and the other four relationships,

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[12] If it is stipulated that in the solution all variables must be non-negative and that both production processes are subject to the law of constant returns to scale, then the solution of (1) to (6) can be readily characterized by the method of parametric programming. See [3].

i.e., (1), (2), (4), and (5), would define a regular neoclassical guns-and-butter production possibility surface. This I shall refer to as the social transformation function (or STF) because, as will become evident, it is the boundary relationship referred to above.

If there is no incipient redundancy of labor, i.e., if (5) is binding, the STF is a smooth, convex surface, such as the arc $AG$ in Figure 1.[13] Then, if there exists a set of welfare weights, $P_C$ and $P_I$, the output combination which maximizes the value of (6) is found at the tangency of the STF and a price-income line whose slope is defined by the ratio of the weights.[14] Corresponding to this output combination the solution provides a set of competitive market prices which also includes a free market wage rate. So as to differentiate the latter from an institutional wage rate, it will be designated by $U_W$. It is obvious that this market wage rate must be zero when labor is redundant and positive when labor is scarce (i.e., if on the STF the marginal product of labor is positive when fully employed). In either case, as a condition of competitive equilibrium on the STF, labor must be so allocated as to equate the value of its marginal product in all activities to this wage rate. Hence, when $\bar{w}$ is zero, we can write

$$(8) \qquad\qquad P_C f_L = U_W = P_I F_L;$$

where $f_L$ and $F_L$ represent the marginal productivities of labor in the production of $C$ and $I$ respectively. An exactly analogous expression exists for capital which, if $\bar{w}$ is zero, is identical to the condition of capital allocation in a competitive *free* market system.

## 2. The Feasibility Function Specific to a Given Wage Rate (FF\bar{w})

Now consider the case of a positive institutional wage rate fixed in real terms at, say, $\bar{w} = w^*$. Relationship (3) now becomes relevant. Specifically, we are advised that, if production is to take place on the STF, the output of $C$ must be at least as great as the wage-consumption demand of the fully employed labor force, so that to satisfy the latter

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[13] The greater the total labor endowment relative to the capital stock, the "flatter" the transformation function. In the limit—if constant returns to scale production functions themselves have clearly defined regions of redundancy—the transformation function between $C$ and $I$ must be a straight line. This is so because then $K$ is the only scarce input which, as long as the wage rate is zero, is always utilized with just the amount of labor sufficient to lower the marginal product of labor also to zero.

[14] The price-income line is obtained by rewriting (6) in the form

$$C = Y/P_C - P_I/P_C I$$

where $Y/P_C$ is the intercept on the $C$ axis and represents the value of the national product in terms of $C$. If the *STF* is a straight line function, then a linear maximand, such as (6), could not yield a determinate solution at other than vertex points. In that case a nonlinear welfare function or objective function such as discussed below, is necessary for a determinate solution.
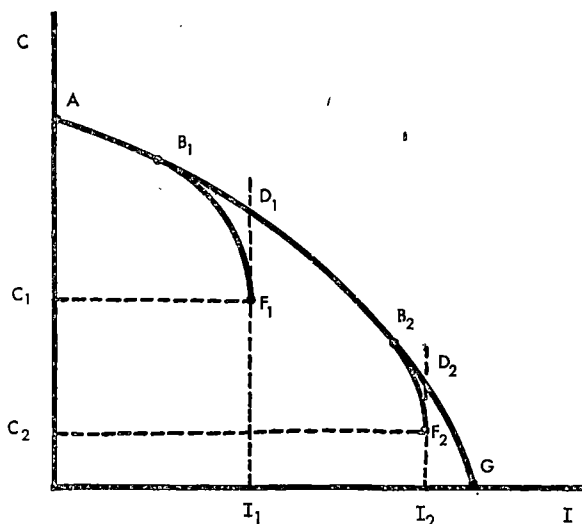
there must be some feasible minimum output of $C$, function of $\bar{w}$. This is found at that point on the STF where (3) just turns binding, i.e., where $w^*L(t) = C$.[15] If this takes place at point $B_1$ in Figure 1, then it is obvious that the feasible segment on the STF consists of the arc $AB_1$ representing either a part or the totality of the $FFw^*$, and that the arc $B_1G$, being nonfeasible, is irrelevant.

But what if society desires a higher rate of investment than feasible at $B_1$? If the wage rate could be lowered below $w^*$, (3) would cease to be binding at $B_1$ and more $C$ could be sacrificed along the arc $B_1G$ for increasing the output of $I$. Assume, however, that the wage rate is being maintained at $w^*$. Then consumption can be further reduced only if the rate of employment itself is *pari passu* diminished. It follows that if the output of $I$ can at all be increased above its level at $B_1$, production will have to take place below the STF.

It has to be demonstrated, however, that the sacrifice in consumption and employment can be matched by a compensatory increase in investment, i.e., that the $FFw^*$ can have a continuation below the STF, as illustrated by the arc $B_1F_1$ in Figure 1. On this point we can reassure ourselves by comparing the changes in the supply of and demand for $C$ at $B_1$ which occur if the marginal unit of labor is removed from the $C$ sector. The loss in supply is the marginal physical product $(f_L)$ and the reduction in demand corresponds to $w^*$, both measured in units of $C$. At $B_1$ the following three possibilities exist:

[15] Given a sufficiently high $\bar{w}$, there may be no feasible point on the STF. I shall assume, however, that this is not the case.

(9a)   $f_L > w^*$;       (9b)  $f_L = w^*$;       (9c)   $f_L < w^*$.

Clearly, (9a) must be irrelevant to a surplus labor economy. The removal of the marginal unit of labor would reduce the supply of $C$ by more than the wage demand. In such circumstances an *increase* in the total labor force without any change in the capital stock could lead to an increase in both wage-consumption and investment, a result inconsistent with the phenomenon of surplus labor.[16]

The case of (9b) cannot be dismissed as irrelevant. However, since the drop in the supply caused by the removal of the marginal unit of labor would just match the corresponding drop in the wage-consumption demand, no resources could be released from the $C$ sector for use in the production of $I$.[17] It follows that the output of $I$ cannot be raised above what is feasible at $B_1$ and the $FFw^*$ consists of the arc $AB_1$. The significance of this case is that it represents the knife edge between the states of full employment and surplus labor. However, if $w^*$ is arbitrarily selected the likelihood is infinitesimal that (9b) should be satisfied at the same point where (3) turns binding; hence, the relevance of this case is theoretical rather than practical.

There remains the case of (9c) which does provide the opportunity of a tradeoff between consumption and investment. Here if the marginal unit of labor is retired into unemployment, the demand for $C$ is reduced by a greater amount than the supply of $C$ so that some resources can be transferred from the $C$ into the $I$ sector. Furthermore, as long as $w^*$ exceeds $f_L$, this same procedure can be continued. However, because the capital stock is constant in the short run, as the rate of employment decreases, the capital labor ratio and labor's marginal product in both occupations *pari passu* increase.[18] As a consequence, the gap between $f_L$ and $w^*$ diminishes and the rate at which resources can be released from the $C$ for use in the $I$ sector also diminishes. This is illustrated by the arc $B_1F_1$ in Figure 1, where the marginal rate of transformation keeps increasing until it reaches the vertical just when $f_L$ becomes equal to $w^*$. At that point nothing could be gained from further reducing the rate of employment, hence at $F_1$ the highest feasible rate of investment

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[16] Alternatively, if $f_L$—which in a competitive free labor market also represents the real wage—exceeds $w^*$, then the institutional wage is a ceiling and not a floor; therefore, there can be no surplus labor problem. Of course, if the rate of growth of the capital stock $(I/K)$ is less than the rate of growth of the labor force, in the long run the economy may slide into a state of surplus labor. This will be discussed later.

[17] In fact, the elimination of the next unit of labor would already raise $f_L$ above $w^*$ resulting in a reduction of both outputs, i.e., in a feasibility function which bends backward from $B_1$ to the origin. This can clearly be ruled out as inefficient under any welfare system.

[18] This assumes that the production functions permit smoothly continuous factor substitution. With fixed coefficients the argument must be restated as in the linear programming example below. In either case, underlying the process is the increase of the aggregate (national) capital employment ratio.

is attained.[19] Simultaneously consumption—which because of (3) constrains the rate of employment all along $B_1F_1$—reaches its minimum, i.e., just that level needed to maintain the maximum feasible rate of investment consistent with $w^*$.

Thus, the $FFw^*$ consists of two segments: the arc $AB_1$ which coincides with the STF and the arc $B_1F_1$ which falls below it. It is evident, however, that had we chosen a nonzero wage rate smaller than $w^*$—say $w^{**}$—then we could have increased the output of $I$ along the arc $AG$ past $B_1$. Such a $FFw^{**}$ is shown by $AB_2F_2$ in Figure 1. Analogously to the case of $w^*$, (3) is not binding along the segment $AB_2$, but constrains the rate of employment on the segment $B_2C_2$ which is below the arc $AG$. Thus $AG$ constitutes a boundary relationship also for this feasibility function, and it would be easy to demonstrate that such must be the case with any and all possible $FF\bar{w}$.[20] It is in this sense that $I = I(C; \bar{w} = 0)$ should be thought of as the social transformation function.

## 3. Conditions of the Social Optimum and the Shadow Prices

As in the case of the STF, the optimum combination of outputs is found at the tangency of the price-income line formed from (6) and the $FF\bar{w}$. The smaller $P_I$ is relative to $P_C$, the more likely it is that the optimal combination of outputs will lie on that segment which coincides with the STF. Conversely, the greater $P_I$ is relative to $P_C$, the more likely it is that production will take place on the segment which is below the STF. In the limit, when $P_C$ is zero, i.e., if consumption is not valued per se, production will take place at that point of the $FF\bar{w}$ which corresponds to the largest attainable rate of investment consistent with $\bar{w}$.[21]

In either case, associated with each maximum solution there is a set of shadow prices and the different segments of the $FF\bar{w}$ can best be characterized in terms of the latter. The prices themselves represent the direct and indirect contributions of the marginal units of each output or service to the value of (6). Formally they are derived from the mathematical conditions of the maximum of (6) subject to the relationship (1) to (5), but they can also be deduced from a general understanding of how this economy must function.[22]

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[19] In fact, for the same reasons as under (9b) a further reduction in the rate of employment would result in a backward-bending feasibility relationship.

[20] If $\bar{w}$ exceeds $C/L$ at $I=0$, then the $FF\bar{w}$ must lie everywhere below the social transformation function with its vertex lower than $A$. In this case (3) is always binding and full employment cannot be attained anywhere on the $FF\bar{w}$.

[21] $P_C=0$ implies that the price-income line formed from (6) is vertical to the $I$ axis and tangent to $I=I(C; \bar{w})$ at its maximum.

[22] The relationships (10) to (15) below are actually differential relationships obtained by partially differentiating with respect to the output and input variables the following Lagrange expression:

To this end consider the uses of the two goods which enter the maximand, i.e., relationship (6). Investment is produced for the provision of future consumption, but in a temporal reckoning constitutes nothing but a final good. Hence, the shadow price of $I$ $(U_I)$ is its direct contribution to the value of the maximand, so that we can write

$$(10) \qquad\qquad U_I = P_I.$$

However, the same cannot be said about consumption, which is produced for two distinct purposes: (a) as a final good for its temporal enjoyment and (b) as an intermediate good or an input to sustain the labor employed in turning out the national product. The first type of use is evident from the fact that consumption is a socially valued activity. The second is evident from (3): labor requires $C$ in the same way as a tractor needs fuel. Though the two purposes of $C$ are fulfilled simultaneously, $P_C$ values only its direct contribution to welfare, as attested by the fact that even if $P_C$ is zero, i.e., if consumption is not valued per se, the output of $C$ must still be positive at the level that corresponds to the maximum investment point of the $FF\bar{w}$. It follows that there must be a *market price* $(U_C)$, i.e., the price needed to bring forth the last unit of $C$, which cannot be zero under any circumstances and which must contain both the arbitrarily given *welfare valuation* $(P_C)$ and the implicit *input valuation* $(U_{CW})$. Accordingly, the market price can be written as

$$(11) \qquad\qquad U_C = P_C + U_{CW}.$$

Now the relationships governing the allocation of resources can also be deduced. Denoting the rent of capital by $U_K$ and its marginal product in the two employments by $F_K$ and $f_K$ respectively, capital will be optimally used if

$$(12) \qquad\qquad U_I F_K = U_K,$$

and

$$(13) \qquad\qquad U_C f_K = U_K.$$

These are the well-known conditions for the equivalences of the values of the marginal products. An analogous set must be available also for the employment of labor. The social cost of labor is determined, how-

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$$P_C C + P_I I - U_I[I - F] - U_C[C - f] - U_{CW}[\bar{w}L_I + \bar{w}L_C - C]$$
$$- U_K[K_I + K_C - K(t)] - U_W[L_I + L_C - L(t)].$$

The Lagrange variables which can be interpreted as shadow prices are denoted by the $U-s$ where the subscripts identify the constraints they are associated with. Although the differential relationships should properly be written in the form of inequalities, I have not done so because, excepting the case where $P_I = 0$, they are always binding.

ever, not only by its relative scarcity but also by the constraint on its use due to the consumption requirement. Correspondingly, the shadow wage rate $(U_L)$ itself must have two component elements: a competitive wage rate $(U_W)$ determined by labor's relative scarcity, and the consumption requirement priced in terms of the input valuation of $C$. Accordingly, the marginal equivalences regulating labor's employment can be written as

(14) $$U_I F_L = U_L = U_W + U_{CW} \bar{w},$$

and

(15) $$U_C f_L = U_L = U_W + U_{CW} \bar{w}.$$

These relationships reduce to simpler forms if the segment of the $FF\bar{w}$ where the optimal production is to take place can be identified. Specifically, we know that on the segment which coincides with the STF the consumption constraint (3) is not binding, because more $C$ is produced for final use than is needed to maintain the labor force. Then, because $C$ *qua* input is not scarce, its input valuation $(U_{CW})$ is zero so that $U_C = P_C$ and $U_L = U_W$. Now (14) and (15) can be written as ·

(16) $$P_C f_L = U_W = P_I F_L.$$

Notice that this relationship is identical to (8), i.e., to the condition which governs the optimal allocation of labor when $\bar{w}$ is zero. From this follows the first allocation rule in the surplus labor economy which is that: if the supply of consumer goods does not constrain the rate of employment, labor should be allocated *as if* the wage rate were determined in a purely competitive free labor market and not institutionally fixed.

On the other hand, when the $FF\bar{w}$ is below the STF, consumption does constrain the rate of employment so that the institutional wage consumption is directly relevant to social allocation decisions. Then, because $C$ as an input is scarce, $U_{CW}$ is positive and, because labor is not fully employed, $U_W$ is zero. It follows that $U_L = U_{CW} \bar{w}$, so that (14) and (15) can be written as

(17) $$U_I F_L = U_{CW} \bar{w},$$

and

(18) $$U_C f_L = U_{CW} \bar{w};$$

or, by substituting (11),

(19) $$U_I F_L = (U_C - P_C) \bar{w},$$

and

$$(20) \qquad U_C f_L = (U_C - P_C)\bar{w}.$$

Now, as the second allocation rule in the labor surplus economy we can state that: if the supply of consumer goods does constrain the rate of employment, labor should be allocated so as to equate the *market value* of its marginal product in each sector to the *input value* of the institutional wage rate. In other words, if the marginal products are valued in terms of the market prices, the institutional wage rate—because it represents not only the real wage cost but also the consumption of the marginal unit of labor—must be valued in terms of a price which is less than the market price by the value of the weight society places on consumption per se.

The above condition also reveals that if a continuous adjustment of factor proportions is possible and *if consumption is valued per se, the maximum investment point on the FFw̄ cannot be socially optimal*. This is evident from (20) which indicates that, if $PC > 0$, then in equilibrium $\bar{w} > f_L$.[23] But we know from the discussion of (9c) that the point of maximum investment is attained only when $\bar{w} = f_L$, and that if $\bar{w} > f_L$, the rate of investment cannot be at its maximum.[24]

It follows as a corollary that *if consumption is valued per se, a competitive free market system cannot attain the social optimum* in this labor surplus economy.[25] This is so because the free market solution must necessarily coincide with that point of the $FF\bar{w}$ where the fundamental condition of private profit maximation, i.e., the equating of the marginal product to the real wage rate, is satisfied. The employer must pay the market value of $\bar{w}$ as the money wage rate so that the *free* market

[23] (20) can be restated in the form $f_L/\bar{w} = (U_C - P_C)/U_C$, to show that in equilibrium the ratio of $f_L$ to $\bar{w}$ must be identical to the percentage difference between the market and the welfare price. Only if the latter is zero can the two be identical.

[24] This can also be shown if, by eliminating the shadow prices from relationships (10) to (15), the marginal conditions are restated in terms of the ratios of marginal productivities. Notice that on that segment of the $FF\bar{w}$ which is below the STF the market price of $C$ differs from its welfare price. Hence, on that segment there must be two sets of tangency conditions: one in the output and one in the utility space. The condition in the output space is given by

$$f_L/F_L = U_I/U_C = f_K/F_K,$$

and in the utility space by

$$P_I/P_C = (f_L/F_L)\bar{w}/(\bar{w} - f_L).$$

In the latter the ratio of the marginal products is weighted by the percentage gap between $\bar{w}$ and $f_L$. When $P_C > 0$, then $\bar{w} > f_L$ and the ratio is positive, so that the slope of the $FF\bar{w}$ at the tangency is negative. When $P_C = 0$, then $\bar{w} = f_L$ and the gap vanishes. When $f_L > \bar{w}$, the expression is negative signifying a "hyper-negative" marginal rate of transformation, i.e., a backward bending segment on the $FF\bar{w}$. The implication is that the maximum of $I = I(C; \bar{w})$ is at $P_C = 0$. (Note that with constant returns to scale the convexity of the feasible region is assured so that there is no need to consider the second order condition.)

[25] Exception must be made for the knife edge case (9b).

condition of profit maximization would be

$$(21) \qquad\qquad U_I F_L = U_C \bar{w} = U_C f_L.$$

The social conditions of optimal allocation reduce from (19) and (20) to (21) and $f_L$ becomes equal to $\bar{w}$ only when $P_C$ is zero which is at the maximum investment point. Hence, *the maximum investment point represents the free market solution* in the labor surplus economy.

### 4. *The Identification of the Welfare Weights*

The derivation of the shadow prices hinges, of course, on the knowledge of the welfare weights $P_I$ and $P_C$. If the welfare function is known, the ratio of the two, i.e., the relative weights, can be identified as the slope of the $FF\bar{w}$ or the welfare function at the point of tangency. In that case, the shadow prices represent the increments in utility with respect to particular activities. Welfare functions, however, may be too general to be directly applicable to this approach to quantiative planning: their arguments are the temporal level and the rate of growth of $C$ and their values are not cardinally measurable in terms of income. Instead, to fit the conditions of this analysis, I shall adopt a simpler relationship—to be referred to as the objective function—which has current consumption and investment as its arguments and a scale which is so chosen as to permit the cardinal measurement of social welfare in terms of income.[26]

The specific form of the objective function is given by

$$(22) \qquad\qquad U = I^p C^{1-p}; \qquad 0 \leqq p \leqq 1.$$

The exponent $p$ is a parameter representing the proportion of investment and $(1-p)$ the proportion of consumption in the national product valued at welfare prices. In other words $p$ is the social average propensity to save and $(1-p)$ the social average propensity to consume out of income valued at welfare prices. The choice of a particular $p$ represents a fundamental social decision about the desired balance between current and future welfare.

If (22) replaces (6) as the maximand then $P_I$ and $P_C$ are themselves determined as shadow prices in a process of optimization. Their values are then given by

$$(23) \qquad\qquad P_I = pU/I, \quad \text{and} \quad P_C = (1-p)U/C.^{27}$$

But because the scale of $U$ is so chosen as to be cardinally measurable in terms of income, we can write

$$(24) \qquad\qquad P_I = pY/I, \quad \text{and} \quad P_C = (1-p)Y/C,$$

[26] For this purpose the function must be first order homogeneous.

[27] These can be directly obtained by partially differentiating (22) with respect to $I$ and $C$.

where $Y$ is the equilibrium level of income valued at welfare prices and $C$ and $I$ are the equilibrium rates of output.

With the introduction of the objective function the two arbitrary welfare weights are replaced by a single policy parameter which has intuitive meaning for the planner.[28] The larger $p$ is, the greater is the weight on investment and growth relative to consumption per se. In the limit, as is evident from (24), the welfare valuation of $C$ is zero.[29]

### 5. *Policies for Attaining the Social Optimum*

The discussion in 3, above, suggests that, if production takes place at any but the maximum investment point on the $FF\bar{w}$, in the absence of government intervention the market mechanism returns the economy to the free market solution. In fact, as long as the marginal cost of labor exceeds the marginal revenue due to the last unit of labor, the natural response of profit maximizing employers in stable markets is to keep lowering the rate of employment. By this method the marginal product is raised to the point where it equals the wage rate and the conditions of profit maximization are satisfied. In the process, the free market forces lead to the largest attainable rate of investment at the expense of employment and redistributed consumption.

But what if the free market solution is inconsistent with social preferences, which must be the case if consumption is valued per se? Then the market forces must be offset either by imposing direct controls on resource allocation or by amending the price system so as to encourage individual entrepreneurs to use resources in the socially optimal pattern.

The comparison of (19) and (20) with (21) reveals that there is a difference between the private and public cost of (or benefit from) the last unit of employed labor. The private benefit is the market value of the marginal product in each sector and the private cost is the market value of $\bar{w}$ to be paid as the money wage rate by the employer. What is registered in (19)–(20) but not considered by the private employer is that the wage payment turns directly into consumption—a socially valued activity—which directly augments the welfare value of the national product by the amount $P_C\bar{w}$. This is a nonmarket benefit which, if the socially optimal rate of employment is to be attained by decentralized means, must either be added to the marginal market returns imputable to labor or subtracted from its cost.

It is evident that a payroll subsidy of $P_C\bar{w}$ per unit of labor is just

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[28] As added advantage, if the preparation of the plan requires the application of linear programming, the fixed coefficient approximation of (22)—as will be seen in Part II—permits the derivation of single valued solutions which a linear maximand such as (6) would be incapable of generating at other than vertex points.

[29] When $p=0$ or 1, (22) represents linear maximands which are horizontal or vertical to the $I$ axis, respectively. When $0<p<1$, the function is a rectangular hyperbola.

right for the purpose. But what should be the source of the funds for such a subsidy? Inspection of the functional distribution of income among the productive factors, i.e., the factor shares imputed to scarce resources, provides the answer. It will be different, of course, on the two segments of the $FF\bar{w}$.

When consumption constrains the rate of employment, i.e., on that segment of the $FF\bar{w}$ which is below the STF, labor is underemployed, so that capital is the only scarce resource. Hence, the entire welfare value of the national product must be imputed to capital as rental income and we can write

$$(25) \qquad U_K K(t) = P_I I + P_C C.$$

At the free market point, when $P_C = 0$, the welfare value of the national product consists of the value of investment. In that case no payroll subsidy is required, because the entire market value of the $C$ output is paid out to labor in the form of wages. On the other hand, when $P_C$ is greater than zero, there is a gap of $P_C \bar{w}$ between the money wage rate and the social cost of labor, requiring a total payroll subsidy of $P_C \bar{w} E$ or, because of (3), $P_C C$. If this amount is taxed away from the rental income of capital and returned to the employers in the form of the subsidy, total rents after taxation amount to

$$(26) \qquad rK(t) = P_I I,$$

where $r$ is the rate of return to capital *after* profit taxation.

The gap between the private and social cost of labor, which was shown to correspond to the welfare valuation of $\bar{w}$, can also be expressed in terms of the market price of $C$. From (20) the subsidy required per unit of employed labor $(S_E)$ amounts to

$$(27) \qquad S_E = U_C(\bar{w} - f_L) = P_C \bar{w}.$$

It goes without saying that the higher the desired level of employment the greater the labor intensity of production (or the lower labor's marginal productivity) must be, and hence, the larger the payroll subsidy must be relative to the value of labor's marginal product. In the limit, if labor were redundant even on the STF, all wages would have to come from subsidies.

When consumption does not constrain the rate of employment, i.e., when (3) is not binding, the $FF\bar{w}$ coincides with the STF. Then, if labor is scarce, part of the total income must be imputed also to labor. The share corresponds to what in the absence of an institutional remuneration labor's competitive free market wage income would be, i.e., $U_w L$ or $P_C f_L L$.[30] Then the imputed rental income of capital can be written as

[30] See relationship (16).

(28)        $U_K K(t) = P_I I + P_C C - U_w L = P_I I + P_C (C - f_L L).$

The need for a payroll subsidy exists also on this segment of the $FF\bar{w}$. The expression under (27) is valid but, because $FF\bar{w}$ coincides with the STF, the market price $(U_C)$ is identical with $P_C$, so that the subsidy per unit of labor can be written as

(29)                   $S_L = P_C (\bar{w} - f_L).$

In addition, we must remember that on this segment of the $FF\bar{w}$ (3) is not binding, i.e., the $C$ output exceeds the wage demand. The value of this surplus is already included in the share of capital under (28) but its market must still be identified. Since consumption from rents is by assumption zero, it is up to the government to purchase the surplus at the price $P_C$ for redistribution, storage, or for some other purpose. This indicates the need for further profit taxation in the amount of

(30)                   $T_C = P_C (C - \bar{w} L).$

The rental income after taxes is obtained by subtracting the payroll subsidy and the tax for the purchase of the surplus goods from (28). If $r$ again stands for the profit rate after taxes,

(31)            $r K(t) = U_K K(t) - L S_E - T_C = P_I I.$

Note that whether the purpose of taxation is to finance simply a payroll subsidy or to purchase the surplus of consumer goods as well, the resulting rental income after taxes—as shown by (26) and (31)— coincides with the value of total investment. Recall now the objective function (22) whose exponent $p$ was defined as the social average propensity to save out of the national product at welfare prices.[31] Since the two weights $P_I$ and $P_C$ could be expressed in terms of this single parameter, based on (24) we now can write

(32)                        $pY = P_I I$

and by substituting either (26) or (31)

(33)                        $pY = rK(t).$

In other words, rental income after taxes must equal the desired social rate of savings. When surplus labor exists (i.e., when (5) is nonbinding

[31] Remember, though, that the income concept from which the social savings rate is obtained is based on welfare prices and not on market prices customarily used in national income accounts. Whereas the welfare price and market price of $I$ are identical, this is not always the case with the consumer good as indicated by the discussion preceding (11). National income accounting would use the market prices $U_I$ and $U_C$ to value the products and to account wages and profits as $U_C \bar{w} L$ and $Y - U_C \bar{w} L$, respectively. These, being *ex post* magnitudes representing the market outcome after the application of the tax-subsidy scheme, could coincide with welfare values only if $U_C = P_C$, i.e., on the STF itself.

so that $U_{\bar{w}}=0$ either because the $FF\bar{w}$ is below the STF, or because there is an incipient redundancy of labor on the STF) we can further write

$$(34) \qquad pY = pU_K K(t) = rK(t),$$

from which

$$(35) \qquad r = pU_K.$$

It follows that the rate of return tax must be $(1-p)$. In the free market solution, when $p$ is equal to one (i.e., when the social valuation of consumption is zero), then the tax rate is zero, and $r$ is identically equal to $U_K$.

## 6. Growth and Welfare Optima

The planning problem cannot be solved, of course, without considering the time path of consumption and employment. In the temporal solution, to each welfare optimum on the $FF\bar{w}$ a unique level of $I$ corresponds. If $I$ is homogeneous and the capital stock is optimally divided between the two sectors, then $I/K(t)$ represents the instantaneous rate of growth of the capital stock. The higher the rate of investment relative to the stock of capital the higher will be the rate of capital accumulation. However, the effect of the latter on the rates of growth of other activities cannot be deduced without knowing the exact conditions prevailing elsewhere in the economy.

As long as surplus labor exists (i.e., when (5) is nonbinding) capital is the only scarce input. In that case, with constant returns to scale in all activities, it is evident that the outputs of $I$, $C$, income, and employment must grow at the same constant rate as the capital stock.[32] Let us denote this balanced growth rate by $g_{pw}$ where the subscripts represent the particular social savings rate and the real wage rate. Then we can write

$$(36) \qquad g_{pw} = I/K(t).[33]$$

However, the real rate of return to capital after taxes is defined by

$$(37) \qquad q = r/P_I,$$

and from (32)–(33) we know that

$$(38) \qquad P_I I = rK(t).$$

[32] If initially the capital stock is not optimally divided among the sectors, i.e., if the system starts out from arbitrary initial conditions, then the path will asymptotically approach the balanced growth path as long as capital is the only scarce input. This requires, however, that the production functions have the additional property $g(0)=0$, $\text{Lim}_{K \to 0} g'(k) = \infty$ and $\text{Lim}_{K \to \infty} g'(k)=0$, where $k$ is the capital labor ratio.

[33] For the sake of this argument, it is assumed that $I$ represents net investment.

From this last expression, by substituting for $r$ in (37), we obtain

$$(39) \qquad\qquad q = I/K(t) = g_{pw}.$$

In other words the growth rate is identically equal to the real rate of return to capital.[34] The latter will naturally be at its highest when production takes place at the maximum investment point of the $FF\bar{w}$, which is another reason why that point must represent the competitive free market solution.

The free market solution is socially optimal only if consumption is not valued per se, i.e., if $\bar{p}$ equals one. For any $p$ less than one, the rates of current consumption and employment are larger than in the free market solution, but because the corresponding investment is lower, their rates of growth are also lower. Each particular solution requires a different length of time for the elimination of unemployment, so that the choice of $p$ in fact implies a choice among growth paths which have distinct income distributional consequences.

Starting from an initial state of unemployment, the rate of growth associated with the free market point on the $FF\bar{w}$ defines the time minimizing path to full employment.[35] This is shown in Figure 2 where (in semi-log plotting) the full employment ceiling is represented by the upper line (itself growing at rate $n$) and where the equilibrium time path of employment corresponding to $p=1$ starts out at Log $E_1$. The slope of this line is the maximal rate of growth requiring the greatest initial sacrifice in terms of temporal employment and consumption of which the system is capable given that $\bar{w}=w^*$. If consumption is valued per se, i.e., if $p$ is smaller than one, the path starts out with a higher initial rate of employment and consumption, but the rate of growth is lower and hence the time needed to attain full employment is longer. This is illustrated by the path starting at Log $E_1$ in Figure 2. The smaller $p$ is, the smaller the equilibrium growth rate. If the latter is less than $n$, it is insufficient for reaching full employment. It is possible, of course, that even the maximal growth rate (i.e., at $p=1$) could be less than $n$. In that case full employment could not be attained without a cut in the wage rate.

The preceding analysis is relevant only if the growth path starts out from an initial state of unemployment. But if full employment is feasible anywhere on the $FF\bar{w}$—as we assumed could be the case—the govern-

[34] Given the savings assumptions and a constant marginal utility of income, this rate of return also represents the rate of interest. Furthermore, since $q$ is the real rate of return *after* the application of the corrective tax-subsidy scheme, it is also the social rate of interest. However, if consumption by capitalists were represented not as a constant proportion of $\bar{w}$ but as a function of either the capital stock or the rate of return, the interest rate would exceed the growth rate.

[35] See Lefeber and Chakravarty [5]. Note that this path conforms to "the golden rule" of capital accumulation. See Phelps [10].
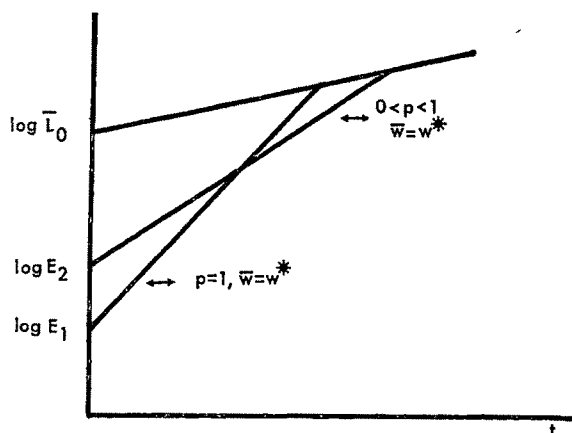
FIGURE 2

ment may want to move immediately to establish full employment with
the help of a tax-subsidy program. With such a move the rate of growth
of employment would be limited to the growth of the labor force and
the resulting growth path would not be balanced.[36] Of course, the
government would want to pursue this policy only if full employment
could be maintained also in the long run. This requires that as long as $\bar{w}$
exceeds $f_L$ the rate of growth of the capital stock $(I/K)$ should exceed
the rate of growth of the labor force $(n)$. If $I/K$ were less than $n$ then
the rate of growth of the consumer good output would also be less than
$n$ and full employment could be maintained only temporarily. When the
full employment demand for $C$ could no longer be satisfied, the economy
would have to revert to a state of unemployment.

## 7. The Effect of Changing the Wage Rate

If the growth rate associated with the free market solution is less
than the rate of growth of the labor force, the institutional wage rate is
incompatible with employment objectives. Then, only by cutting $\bar{w}$
from $w^*$ to some $w^{**}$ can the minimum consumption requirement of the
fully employed labor force be lowered to permit the increase of the rate of
investment (growth). The new $FFw^{**}$ would have the form of $AB_2F_2$ in
Figure 1 if condition (9c) were again satisfied, i.e., if $f_L < w^{**}$ at the
point where (3) becomes binding. One must keep in mind, however,
that the case may be different. The marginal products of the inputs do
change along the STF; hence, it could happen that a change in the wage
rate—depending on the induced changes in the output combination and
in the marginal products—might result in the elimination of the gap

[36] Balanced growth in full employment requires both that production should take place
at a free market point on the STF (as in case 9b) and that $I/K$ should be the same as $n$.

between $\bar{w}$ and $f_L$ in full employment. If this were the case, the change in the wage rate would also eliminate the state of surplus labor. Furthermore, depending on the relative factor intensities in the two industries, this same result may be possible in response to either a *decrease* or an *increase* in the institutional wage rate.[37]

This is an important result. It implies that if there is no incipient redundancy of labor, a state of surplus labor cannot be unambiguously identified without reference to a specific wage rate.[38] But more significant than that is the further implication that the employment effects of wage changes cannot be determined in the surplus labor economy without taking into account also the prevailing sectoral factor intensities. Specifically, even though a wage cut accompanied by a tax-subsidy scheme can always result in a higher rate of total employment, the same cannot be said with certainty about the free market consequences of a wage cut. This is quite evident in the case of fixed coefficient technologies where the direction of the change in the rate of employment is determined by factor proportions alone. For instance, in the numerical analysis of Part II, the rate of employment in the free market solution—contrary to traditional expectation—always decreases in response to a wage cut because the direct and indirect labor requirements of investment are lower than in consumer good production. Depending on the circumstances, such results may also be possible with variable proportions. However, because factor substitution in response to a wage cut may or may not offset the influence of relative factor intensities on the demand for labor, for an a priori judgment on the employment effects of a change in the wage rate one needs more specific knowledge about the structure of production.

Finally, it is interesting to note that when incipient redundancy prevails—as it does in the numerical analysis—if we choose to hold constant the growth rate instead of $\bar{w}$, the maximal growth path cor-

[37] Consider the case where the $C$ sector is labor intensive relative to the $I$ sector. Then, as is well known from trade theory, $f_L$ must increase as the output of $C$ is diminished along the STF. If $\bar{w}$ is cut from $w^*$ to $w^{**}$, the $C$ output can be lowered along the STF from its previous limiting level at $B_1$ to the new point where (3) again turns binding. If $f_L$ rises above $w^{**}$ before this point is reached, the conditions discussed in connection with (9c) cease to exist; instead, the case of (9a) becomes relevant. In other words, relative to the new institutional wage rate, there is no state of surplus labor.

Consider now the converse case where the $C$ sector is relatively capital intensive. If then the output of $C$ increases along the STF, so does $f_L$. An increase in $\bar{w}$ calls for an increase in the full employment demand for $C$. If in the process $f_L$ rises above the new $\bar{w}$ so that (9c) ceases to hold, the state of surplus labor is eliminated. In this case, however, the capacity to invest is diminished and if in the process $I/K$ were to fall below $n$, in time the economy would have to revert to a state of surplus labor.

[38] To avoid the definitional ambiguity, T. N. Srinivasan has suggested in private correspondence that, in the absence of incipient redundancy, a surplus labor economy should be characterized as one in which (a) the savings assumptions of this analysis hold and (b) the $C$ sector is more capital intensive than the $I$ sector and hence there is redundancy of labor at any specific $\bar{w} \gtrless$ some minimum value.
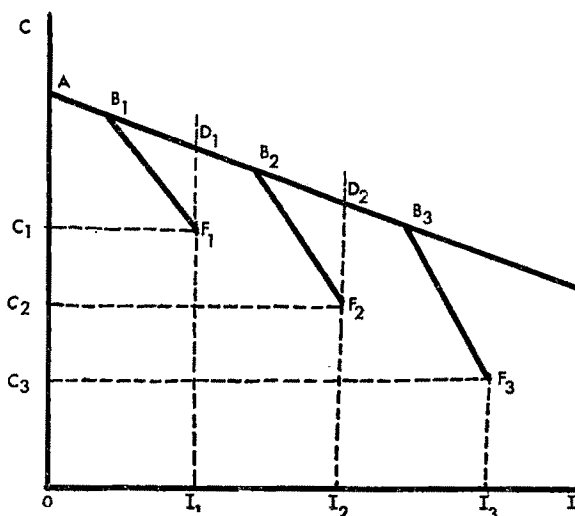
FIGURE 3

responding to $p=1$ is not the fastest to full employment. For instance, assume that investment is maintained at the rate $I_1$ in Figure 3. Then with a suitable cut in the wage rate and a corresponding tax-subsidy policy we can move from $F_1$ to $D_1$ on the STF. The rate of growth remains unchanged at $I_1/K(t)$. At the same time, employment at $D_1$ is larger than at $F_1$. Hence, for a given growth rate, the government-sustained path associated with $D_1$ will not only lead to full employment faster than the free market path but in addition will provide a higher current rate of consumption.

## II. *Numerical Analysis*

The preceding analysis can readily be incorporated into a computable planning model. For purposes of demonstration I adopt a simplified linear programming framework which in addition to consumption and investment also accounts for intermediate output flows and foreign trade. The computations make use of data relating to the Indian economy in 1960 but it should be quite clear that the intention is to illustrate and not to draw authoritative conclusions about development strategy in India.

### 1. *The Structure of the Planning Model*

As a fixed coefficient approximation of the previous objective function we assume that

$$(40) \qquad Y = \min [I/p, C/(1 - p)], \qquad 0 \leq p \leq 1;$$

where $p$ corresponds to the parameter of (22). In the linear programming

model we maximize income, $Y$, subject to the constraints summarized in Table 1 which include (40).[39] As before, in the solution all variables must be non-negative.

There are three outputs $X_1$, $X_2$, and $X_3$, representing the capital goods, the consumer goods, and "universal intermediary"[40] sectors, respectively. The first two sectors each produce a final domestic output, $I$ and $C$, as well as exports $(E_1, E_2)$ and intermediate outputs for exclusive use within the sector of origin $(X_{11}, X_{22})$. The third sector produces only intermediate goods which are for use in all three sectors $(X_{3j})$. In addition, each sector requires imports $(M_i)$, labor $(L_i)$ and capital $(K_i)$. The flow, import, labor and capital coefficients are denoted by $a_{ij}$, $m_i$, $l_i$ and $b_i$, respectively.

The block triangular structure of production is readily depicted in Table 2 which is self-explanatory.[41] Clarification is required only on two points. First, Table 2 does not indicate the wage demand for consumer goods which is expressed by the next to the last direct constraint in Table 1. Second, according to the balance of payments constraint, total imports $(M)$ must equal a constant $(e)$ times total exports $(E)$.[42] The

[39] The constraints of the maximum problem can be obtained from Table 1 by the "direct" reading of the programming matrix. Specifically the central matrix (25×25) of the coefficients is to be post-multiplied with the column vector (25×1) of choice variables, written for convenience as a row vector and located at the top of the center matrix. The constants of the constraints are given in the column vector (25×1) on the right-hand side of the central matrix. This has only one non-zero term, $K(t)$.

The associate "dual" problem of cost minimization has $U_K K(t)$ as its minimand (where $U_K$ is the rate of return on capital). The constraints are obtained by the dual reading of the matrix. The column at the left-hand side is the vector of dual (price) variables. By successively multiplying vectorially the column of dual variables with each column of the central matrix, we obtain the homogeneous part of each dual constraint. The constants are given by a column vector (25×1) which is for convenience written as a row vector below the central matrix. Here, the only non-zero term is the price of $Y$, which is arbitrarily chosen as one.

[40] Alan Manne's terminology. In fact, the structure of production follows his concept of block-triangularity. See [7].

[41] The values of the parameters are based on the structure of the Indian economy in 1960, as described in the two sources [7] and [9]. However, the information was not always available in that form which meets the specifications of this model and in the process of adaptation much accuracy may have been lost, for which the authors of the cited references cannot be held responsible.

[42] Note that this specification maintains the homogeneity of the constraint and hence is consistent with balanced growth. The same is the case with the capital constraints which permit the optimal distribution of the initial capital stock. The system could, of course, be specified to start from arbitrary initial conditions; however, the gain from a possibly better approximation of the true initial conditions may be more than offset by the arbitrariness of the consequent sectoral capacity adjustments. Because of the rigidity due to the fixed coefficients, the maximizing mechanism balances the sectoral outputs by introducing excess capacities which may be very large in the initial periods even if the system converges rapidly to the balanced path. The adjustment process in [2] and [4] illustrates the point. In addition, direct statistical information on initial capacities does not exist and the error of the estimates based on observed initial outputs is difficult to assess. In fact, it is conceivable that the capacities determined by the optimal distribution of the initial capital stock provide a better approximation.

TABLE 1

| | Y | I | C | E | M | X₁ | X₂ | X₃ | E₁ | E₂ | M₁ | M₂ | M₃ | X₁₁ | X₂₂ | X₃₁ | X₃₂ | X₃₃ | L_A | L₂ | L₃ | L | K₁ | K₂ | K₃ | K(t) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_I$ | $\phi$ | $-1$ | | | | | | | | | | | | | | | | | | | | | | | | |
| $P_C$ | $1-\phi$ | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| $U_{X1}$ | | | | 1 | | $-1$ | | | | | | | | | | | | | | | | | | | | |
| $U_{X2}$ | | | | | 1 | | $-1$ | | | | | | | | | | | | | | | | | | | |
| $U_E$ | | | | $-1$ | | | | | 1 | | | | | | | | | | | | | | | | | |
| $U_{FE}$ | | | | | $-e$ | | | | $-1$ | $-1$ | | | | | | | | | | | | | | | | |
| $U_M$ | | | | | $-1$ | | | | | | 1 | 1 | 1 | | | | | | | | | | | | | |
| $U_{X3}$ | | | | | | | | $-1$ | | 1 | $-1$ | | | | | | | | | | | | | | | |
| $U_{X11}$ | | | | | | $-1$ | | | | | | | | 1 | | | | | | | | | | | | |
| $U_{X21}$ | | | | | | $a_{21}$ | | | | | | | | | 1 | | | | | | | | | | | |
| $U_{M1}$ | | | | | | $a_{31}$ | | | | | $-1$ | | | | | | | | | | | | | | | |
| $U_{L1}$ | | | | | | $m_1$ | | | | | | | | | | | | | $-1$ | | | | | | | |
| $U_{K1}$ | | | | | | $b_1$ | | | | | | | | | | | | | | | | | $-1$ | | | |
| $U_{X22}$ | | | | | | | $a_{22}$ | | | | | | | | | 1 | | | | | | | | | | |
| $U_{X32}$ | | | | | | | $a_{32}$ | | | | | | | | | | 1 | | | | | | | | | |
| $U_{M2}$ | | | | | | | $m_2$ | | | | | $-1$ | | | | | | | | | | | | | | |
| $U_{L2}$ | | | | | | | $l_2$ | | | | | | | | | | | | | $-1$ | | | | | | |
| $U_{K2}$ | | | | | | | $b_2$ | | | | | | | | | | | | | | | | | $-1$ | | |
| $U_{X33}$ | | | | | | | | $a_{33}$ | | | | | | | | | | 1 | | | | | | | | |
| $U_{M3}$ | | | | | | | | $m_3$ | | | | | $-1$ | | | | | | | | | | | | | |
| $U_{L3}$ | | | | | | | | $l_3$ | | | | | | | | | | | | | $-1$ | | | | | |
| $U_{K3}$ | | | | | | | | $b_3$ | | | | | | | | | | | | | | | | | $-1$ | |
| $U_L$ | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | | | | |
| $U_{CW}$ | | | $-1$ | | | | | | | | | | | | | | | | | | | $\bar{w}$ | | | | |
| $U_K$ | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | |

VII

VII

1

TABLE 2

|   | 1 | 2 | 3 | $E$ | $I$ | $C$ | $X$ |
|---|---|---|---|---|---|---|---|
| 1 | $a_{11}=.320$ | | | $E_1$ | $I$ | | $X_1$ |
| 2 | | $a_{22}=.210$ | | $E_2$ | | $C$ | $X_2$ |
| 3 | $a_{31}=.074$ | $a_{32}=.031$ | $a_{33}=.520$ | | | | $X_3$ |
| $M$ | $m_1=.126$ | $m_2=.026$ | $m_3=.160$ | $M=1.7E$ | | | |
| $L$ | $l_1=.0005$ | $l_2=.0009$ | $l_3=.0005$ | $\bar{w}=700$ Rs | | | |
| $K$ | $b_1=2.000$ | $b_2=2.500$ | $b_3=6.000$ | $\bar{K}=565.6\times10^9$ Rs | | | |

multiplier $e$ represents the proportion of total imports to total exports, in other words, the balance of payments deficit is a constant proportion of total exports (or imports). The gap can be viewed as a foreign aid requirement tied to export performance. Alternatively, $e$ can be interpreted as a measure of the systematic overvaluation of the domestic currency requiring balance of payments support.

## 2. The Shadow Prices

The dual variables of the cost-minimizing problem are listed in the lefthand column vector of Table 1. These are shadow prices of goods and services as identified by their subscripts.[43] Though this is evident from the dual reading of Table 1, we can nonetheless note that

$$(41) \qquad pP_I + (1-p)P_C = 1;$$

and hence, because $Y$ is composed of $I$ and $C$ in the constant proportions $p$ and $(1-p)$,

$$(42) \qquad P_I I + P_C C = Y.[44]$$

Exports can be supplied from either the capital goods or the consumer goods sector and the export price will be that of the supplying sector. Hence, if both sectors are engaged in exporting, the output prices in the two sectors must be identical. The price of imports is necessarily

$$(43) \qquad U_M = eU_E,$$

where $e$ defines the proportionate balance $M/X$.[45]

[43] The shadow prices identified in the preceding analysis are present in the same notation excepting the market price of the output of the consumer good sector which is now identified by $U_{X2}$ (as opposed to $U_C$ in the preceding analysis). The shadow prices of exports and imports are given by $U_E$ and $U_M$, and that of foreign exchange by $U_{FE}$.

[44] At the maximum investment point $C$ as input into $Y$ is redundant but then $P_C$ is zero.

[45] In Table 1 the shadow price of foreign exchange is identified with the shadow price of imports; however, this is arbitrary. As long as the gap represented by $e$ is present, the economy must operate with two exchange rates (just as a multiple rate system), i.e., $U_E$ and $U_M$. When $e=1$, the shadow rate of foreign exchange is unique.

Finally, the shadow wage rate is $U_{CW}\bar{w}$. Labor has no scarcity value, hence on the STF, when $U_{CW}$ is zero, the shadow wage rate is also zero.

Since shadow prices measure the increment in benefits in response to an increment in a given activity we can write that

(44) $$P_I = \Delta Y/\Delta I, \quad \text{and} \quad P_C = \Delta Y/\Delta C.$$

It follows that

(45) $$P_I/P_C = \Delta C/\Delta I.$$

This is the fixed coefficient counterpart of the relationships in footnote 24. Since the feasible region of a linear program consists of a convex polyhedron, (45) identifies the absolute value of the slope of the linear segment on which the equilibrium combination of outputs is located.

### 3. Derivation of the Social Transformation Function

The STF is derived by setting $\bar{w}$ equal to zero in the program of Table 1. The solutions corresponding to any $p$ must lie on a single straight line relationship between $C$ and $I$. This is so because capital is the only binding constraint and, given unique fixed coefficient production functions, there is no room for technological choice. The only decision open to choice is in the trade sector: should the capital good or the consumer good industry supply exports? Since capital is the only scarce resource, it is evident that the supplier of exports must be the industry which has the lowest total capital requirements per unit of output. This happens to be the second (consumer good) industry.[46]

Solving for the optimal combination of outputs for any arbitrarily chosen $p$ between zero and one yields the associated shadow prices of $I$ and $C$. Their ratio, as indicated by (45), defines the slope of the STF. Next by solving for the maximum $C$ at $I=0$, i.e., by maximizing $Y$ with $p=0$, the vertical intercept on the $C$ axis is obtained. Denoting the latter by $A$, the equation of the STF can be written as

(46) $$C = A - (P_I/P_C)I.$$

Given the data of Table 2, the numerical relationship is as follows:

(47) $$C = 150.56 \times 10^9 - 1.2753I.$$

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[46] Note that the value of $b_1$ is smaller than $b_2$. But these are only direct or partial capital coefficients. If the flow requirements from the third sector and the import coefficients are accounted for, it is readily seen that the total (direct and indirect) capital coefficient in the first industry is higher than in the second.

Since the total capital requirements of both outputs remain constant on the STF, it has the form

$$C = K(t)/d_2 - (d_1/d_2)I,$$

where $d_1$ and $d_2$ represent the total capital coefficients of the first and second sector with the values of about 4.80 and 3.75, respectively. If the source of exports were to be shifted from the second to the first industry, these values would correspondingly increase.

TABLE 3

| $\bar{w}=700$ | . A | $B_2$ | | | $F_2^e$ | $D_2^f$ |
|---|---|---|---|---|---|---|
| $p$ | 0 | 0.176 | 0.177 | 0.185 | 0.186 to 1.000 | 0.182697 |
| $Y^a$ | 150.56 | 143.60 | 143.43 | 141.37 | 141.28° | 143.35 |
| $I^a$ | | 25.27 | 25.39 | 26.15 | 26.19 | 26.19 |
| $C^a$ | 150.56 | 118.33 | 118.04 | 115.22 | 115.09 | 117.16 |
| $E^a$ | 4.19 | 6.68 | 6.74 | 7.47 | 7.51 | 6.77 |
| $E_1^a$ | | | 0.50 | 7.20 | 7.51 | |
| $E_2^a$ | 4.19 | 6.68 | 6.24 | 0.27 | | 6.77 |
| $M^a$ | 7.12 | 11.35 | 11.45 | 12.70 | 12.76 | 11.50 |
| $L^b$ | 182.62 | 168.96 | 168.63 | 164.60 | 164.42 | 168.47 |
| $P_I$ | 0.00 | 1.2164 | 2.4957 | 2.4599 | 1.00 | 1.2143 |
| $P_C$ | 1.00 | 0.9538 | 0.6783 | 0.6686 | 0.00 | 0.9521 |
| $U_{X2}$ | 1.00 | 0.9538 | 2.4957 | 2.4599 | 1.1287 | 0.9521 |
| $U_{CW}$ | 0.00 | 0.00 | 1.8174 | 1.7914 | 1.1287 | 0.0000 |
| $U_L$ | 0.00 | 0.00 | 1272.17 | 1253.94 | 790.07 | 0.0000 |
| $U_K$ | 0.2662 | 0.2539 | 0.2536 | 0.2500 | 0.0463 | 0.2534 |
| $U_E$ | 1.00 | 0.9538 | 2.4957 | 2.4599 | 1.00 | 0.9521 |
| $U_M$ | 0.5882 | 0.5610 | 1.4681 | 1.4470 | 0.5882 | 0.5600 |
| $P_I/P_C$ | | 1.2753 | 3.6792 | 3.6792 | | 1.2753 |
| $g^d(pU_K)$ | 0.0000 | 0.0447 | 0.0449 | 0.0463 | 0.0463 | 0.0463 |

[a] Rs $10^9$.

[b] $\times 10^6$.

° $Y$ corresponding to $p \geqq 0.186$ represents the sum of $C$ and $I$ but *not* the value of the objective function.

[d] Gross of depreciation and net of technological change.

[e] The price column corresponds to the solution with $p=1$. The shadow prices for any $p \geqq 0.186$ are obtained by multiplying each member of this column by $1/p$.

[f] $\bar{w} \leqq 695.5$.

In other words, the social marginal rate of transformation is 1.2753 constant rupee units of consumer goods for each constant rupee unit of investment.

### 4. *Derivation of the Feasibility Function*

Feasibility functions were derived for $w = $ Rs 700 (the average consumption per unit of active labor in India in 1960) and, for comparison, also for a 10 per cent variation around it, i.e., Rs 770 and 630. The results are summarized in Tables 3, 4 and 5 as well as schematically shown in Figure 3. Since the three functions are similar, it is sufficient to discuss only the case of $w = 700$, the details of which are given in Table 3 under the columns denoted by $A$, $B_2$ and $F_2$ corresponding to the vertex points of the diagram in Figure 3.

The $FF\bar{w}$ consists of two linear segments. $AB_2$, for all values of $p \leqq 0.176$, coincides with (47). $B_2F_2$, for all $p \geqq 0.177$, lies below the latter with a steeper slope. The first column under $B_2$, Table 3, corresponds to $p = .176$ and describes a solution which is still on $AB_2$;

TABLE 4

| $\bar{w}=770$ | $A$ | $B_1$ | | $F_1$ | $D_1^e$ |
|---|---|---|---|---|---|
| $p$ | 0 · | 0.078 | 0.079 | 0.087 to 1.00 | 0.08534 |
| $Y^a$ | 150.56 | 147.39 | 147.25 | 145.44$^c$ | 147.10 |
| $I^a$ | | 11.50 | 11.63 | 12.55 | 12.55 |
| $C^a$ | 150.56 | 135.89 | 135.62 | 132.89 | 134.55 |
| $L^b$ | 182.62 | 176.49 | 176.13 | 172.59 | 175.83 |
| | | | | | |
| $P_I/P_C$ | | 1.2753 | 2.9586 | | 1.2753 |
| $g^d$ $(pU_K)$ | 0.0000 | 0.0203 | 0.0206 | 0.0222 | 0.0222 |

$^a$ Rs 10$^9$.

$^b$ ×10$^6$.

$^c$ $Y$ corresponding to $p \geqq .087$ represent the sum of $C$ and $I$ but *not* the value of the objective function.

$^d$ Gross of depreciation and net of technological change.

$^e$ $\bar{w} \leqq 765.2$.

TABLE 5

| $\bar{w}=630$ | $A$ | $B_3$ | | $F_3$ |
|---|---|---|---|---|
| $p$ | 0 | 0.271 | 0.272 | 0.281 to 1.000 |
| $Y^a$ | 150.56 | 140.10 | 139.84 | 137.49$^c$ |
| $I^a$ | | .37.97 | 38.03 | 38.59 |
| $C^a$ | 150.56 | 102.13 | 101.81 | 98.90 |
| $L^b$ | 182.62 | 162.11 | 161.60 | 156.98 |
| | | | | |
| $P_I/P_C$ | | 1.2753 | 5.2388 | |
| $g^d$ $(pU_K)$ | 0.0000 | 0.0671 | 0.0672 | 0.0682 |

$^a$ Rs 10$^9$.

$^b$ ×10$^6$.

$^c$ $Y$ corresponding to $p \geqq .281$, represent the sum of $C$ and $I$ but *not* the value of the objective function.

$^d$ Gross of depreciation and net of technological change.

hence, the slope, as indicated by $P_I/P_C$, is 1.2753. The vertex at $B_2$ is at a $p$ between .176 and .177. The second column under $B_2$, corresponding to $p=.177$, describes a solution on the segment below the STF. There the marginal rate of transformation $(P_I/P_C)$ is 3.6792, i.e., about three times as great as on $AB_2$. The $FF\bar{w}$ reaches its cutoff point with this same finite slope; the maximum $I$ is attained at $F_2$ when $p > .186$.[47] Note that this is in marked contrast to the general case of

[47] The first column under $F_2$ corresponds to $p=.185$ and provides a solution on $B_2F_2$ just short of the maximum attainable $I$. Once the maximum $I$ is attained the output figures remain constant for all solutions $p \geqq .186$. However, the price variables continue to change with $p$. The limiting value is given by the price column corresponding to $p=1$. The prices corresponding to any $p \geqq .186$ are obtained by multiplying the prices corresponding to $p=1.0$ by $1/p$.

continuously adjustable factor proportions in Part I where the point of maximum investment is optimal only when $p$ equals one.

Because of the unique set of fixed coefficient technologies, the burden of increasing the aggregate capital-labor ratio on $B_2F_2$ falls entirely on the composition of exports. On the segment $AB_2$ exports are supplied from the less capital intensive consumer good sector. But moving from $B_2$ to $F_2$, when the rate of employment is constrained by the final output of $C$, the capital-labor ratio is increased through the gradual transfer of the supply of exports from the relatively less to the more capital intensive line of production. At $F_2$, when all exports are supplied from the more capital intensive investment good sector, the limit of capital intensification is reached.[48]

As was the case in the preceding general analysis, the point at $F_2$ represents the free market solution. This is evident from the fact that the net rate of return to capital is at its highest at that point. The row corresponding to $U_K$ in Table 3 provides the gross rents before the imposition of the taxes discussed in Section 4 of Part I. The returns after taxes are obtained by multiplying $U_K$ by the corresponding $p$.[49] But because of the constant currency units in which outputs and capital stock are definied $pU_K$ is also the growth rate which can be read off in the last row (under $g$) of Table 3.

## 5. *Comparison of Alternative FFw̃*

The *FF* specific to $w = 770$, and 630 are described with less detail in Tables 4 and 5. The marginal rate of transformation is identical on the segments which coincide with (47) but different on the segments below the STF. Specifically, it is the highest with $\tilde{w} = 630$ and the lowest with $\tilde{w} = 770$. This is because $I$ is relatively capital intensive; the more $I$ is produced, the higher the total capital labor ratio on the STF itself, and the less the residual potential for further capital intensification.

Growth rates within the range of these experiments are very sensitive to the wage rate. The maximum attainable rates of investment are 8.7, 18.6 and 28.1 per cent of national income and the corresponding maximal growth rates are 2.22, 4.63 and 6.82 per cent respectively.[50] However, the wage elasticity of growth rates decreases with lower wage rates. Thus, a 10 per cent cut in the wage rate from $\tilde{w} = 770$ to 700 more

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[48] Note that because in this particular model there are no means to increase the capital intensity other than by shifting the supply of exports, the segment $B_2F_2$ is short and steep. If multiple production technologies were to be introduced, the segment would be longer and less steep.

[49] At $F_2$ itself no taxation is required even if $p$ is less than one. This is so because $P_C$ is zero and the value of labor's marginal product exactly equals the market value of the institutional wage rate.

[50] These are "gross" growth rates in the sense that no adjustment is made for either depreciation or technological change.

than doubles the growth rate but causes it to increase by less than 50 per cent when $\bar{w}$ is cut from 700 to 630. In either case there is a tremendous leverage which is due to the assumption that the induced increments in rents spill totally into savings and investment.

On the other hand, if the growth rate is held constant, say at the level corresponding to $F_2$, employment can be increased from its free enterprise level to the level at $D_2$ on the STF. This can be accomplished, of course, only at the cost of a wage cut. In this particular case, as can be seen from comparing the values under $F_2$ and $D_2$ in Table 3, a minimum wage cut of Rs 4.5 is sufficient to obtain an increase of four million in total employment. In percentage terms this means that a .64 per cent wage cut yields a 2.5 per cent increase in employment.[51]

This highly advantageous wage elasticity of employment is due to a higher $C$ output coupled with a larger aggregate capital labor ratio on the STF than at the free market points. Whether it can be realized depends on the government's ability to institute a payroll subsidy program as discussed earlier. However, if the subsidy program is not possible, the wage cut may have adverse effects on current employment, as is the case in this example. Comparison of the employment levels at the three free market points, at $F_1$, $F_2$, and $F_3$, indicates that the induced loss in employment is sizeable.

## III. Conclusion

The first point which emerges from the analysis concerns the social role of profits. If they can be made available for investment, the free market in a labor surplus economy leads to the fastest rate of economic growth consistent with an institutionally given real wage rate. Of all the alternatives, however, this is the route to development requiring the greatest sacrifice of current consumption and employment. Nonetheless, since the rate at which unemployment is absorbed is also the highest, the long-run income distributional consequences of the free market are favorable.

Whether they are socially optimal is another question. The free market solution is compatible only with the most austere concept of social welfare which does not value consumption except in terms of its contribution of growth. If society values redistributed current consumption per se, i.e., if society is willing to sacrifice some growth for a higher rate of current employment and hence consumption by wage earners, purely competitive market processes may not lead to a social optimum without some form of intervention.

Consumption and employment can be raised above their free market

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[51] An analogous computation is presented also for the shift from $F_1$ to $D_1$ in Table 4. There a .62 per cent wage cut results in a 1.85 per cent increase in employment.

rates if the resulting excess of the real wage rate over labor's marginal product—a state associated with all but the free market solution—can be offset with a payroll subsidy financed from profit taxation. The subsidy induces more labor intensive techniques of production and therefore automatically increases the demand for labor and consumer goods. The optimal subsidy for a unit of employed labor could be determined only from a knowledge of the parameters of a social welfare function. However, since the wage payment turns into consumption—an activity which contributes to welfare exactly to the extent that it is valued per se—the optimal subsidy may be approximated by the amount of encouragement the political decision makers desire to give to redistributed consumption. The upper limit is, of course, the entire money wage rate, i.e., the market value of the real wage rate which is specified in terms of the consumer good.

Lowering the institutional wage rate may also result in more labor intensive techniques. Nevertheless, a wage cut by itself will not necessarily lead to higher rates of employment or consumption. If the increments to profits are saved it does motivate a higher rate of investment; however, this is at the cost of a lower rate of current consumption and, depending on the effects of relative sectoral factor intensities, possibly even a lower rate of employment. Only if the wage cut is combined with a payroll subsidy can one be certain that, in addition to investment, consumption and employment will also increase.

Finally, a comment on the relevance of this analysis to planning as practiced in reality. According to the preceding argument, for a welfare optimum, growth may have to be slowed down from its free market rate. In contrast, planners are always intent upon raising rather than lowering the growth rate. Actually, there is no intrinsic contradiction. Planners think in terms of minimum politically feasible employment and consumption targets which one may assume are higher than what would correspond to the free market solution. It is subject to these targets that they then attempt to increase the rate of growth. Hence, the optimal solution of the planning problem formulated in these terms may exactly correspond to some point on the feasibility function specific to the given minimum wage rate. A conflict may arise and actual planning may go wrong, however, when the employment and consumption targets are set higher than the free market rate and yet, with no further intervention, the market is relied upon to determine the choice of techniques. In that case the rate of employment will turn out to be less than optimal and targets for the production of consumer goods may prove not to be feasible. If nonetheless the consumption targets are realized, the actual rate of growth will be less than what could be attained with subsidized payrolls.

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# THE VALUE OF TIME IN BARGAINING NEGOTIATIONS: SOME EXPERIMENTAL EVIDENCE

## By Bruno Contini*

The theory of pure bargaining has traditionally been cast in terms of bilateral monopoly. Since the times of Edgeworth it has been known that the outcome of a two-person bargain is substantially unpredictable, except for the fact that it will occur within the so-called "trading area," and that, in order for a solution to have some features of stability, it should be "efficient," i.e., it should be located on a tangency point of the two bargainers' indifference lines (the locus of such points is the so-called contract curve, or set of "Pareto-optimal" contracts).

Edgeworth's model, as well as several of its extensions, are essentially of a static nature except for a recent contribution by J. G. Cross [4]. Time plays no role in spite of the fact that it is precisely the cost of time, both in terms of money and utility, that often motivates the bargaining process.

Cross has suggested that the influence of time upon bargaining may assume different forms. First, it appears in a discounting function if the players discount future benefits (as a reflection of one's impatience). Second, the utility of agreement itself may change with the calendar date (nuclear disarmament is probably more important today with many countries that can potentially produce nuclear weapons than it was fifteen years ago when there were only two such countries). Third, there usually is a fixed cost of bargaining that recurs at each stage of the negotiations. This cost may vary from the simple personal inconvenience of having to spend time in this rather than other occupations, to the immense cost in terms of foregone profit and fixed cost of a temporarily unproductive plant which is borne by a strike-bound firm.

In another paper [2] I have shown that the introduction of time as an explicit variable in the utility function of each bargainer leads to a refinement of the classical conclusions, namely, (1) the outcome of a bargaining process may be "stable" even though it may not be efficient; and (2) the evaluation of time is an important determinant of the so-called bargaining power and the lower the evaluation of time of any
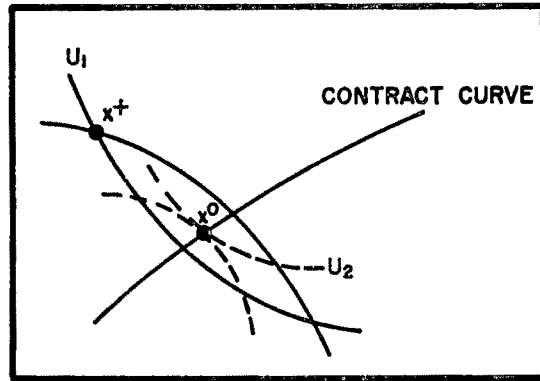
FIGURE 1. AN EDGEWORTH BOX REPRESENTATION OF A TWO-PERSON BARGAINING

given bargainer, the better off, in relative terms, will he emerge from the negotiated solution. The scope of this paper is to present some experimental data that validate a set of hypotheses derived from those remarks.

## I. *The Basic Hypotheses*

Before going into a description of the experimental procedures, I shall summarize the theoretical arguments that underlie the basic hypotheses.

The static analysis of bargaining implicitly assumes that the value of time is zero, or, more precisely, that there is no cost associated with the search for an agreement. In terms of a classical Edgeworth box, it is therefore appropriate to argue that a movement from a nonoptimal position $x^+$ to a position $x^0$ on the contract curve (see Fig. 1) is advantageous for both parties, and that, consequently, $x^+$ cannot be a "stable" outcome of the bargaining process if both players behave rationally. The introduction of the time element in this model merely indicates that $x^0$ today is not the same thing as $x^0$ a year from now, and that, for that matter, $x^+$ today could be better than $x^0$ a year from now, even if it is clearly true that $x^+$ today is not as good as $x^0$ today.

Consider the following "dynamic" reinterpretation, as described by Figure 2. First, assume that each player's utility is a function of the commodity vector $x$ over which agreement is to be found, as well as of time $t$; denote it by $U_i(x, t)$. Assume also that both players are "impatient" in the Fisherian sense, i.e., $\partial U_i/\partial t < 0$,[1] and, for additional simplicity, that their "impatience structure" is completely characterized

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[1] This assumption is sufficient to make the point. In general, however, not only will bargainers be "impatient" but they will also bear the objective costs associated with the negotiatory process. The presence of such costs would make my argument even stronger.
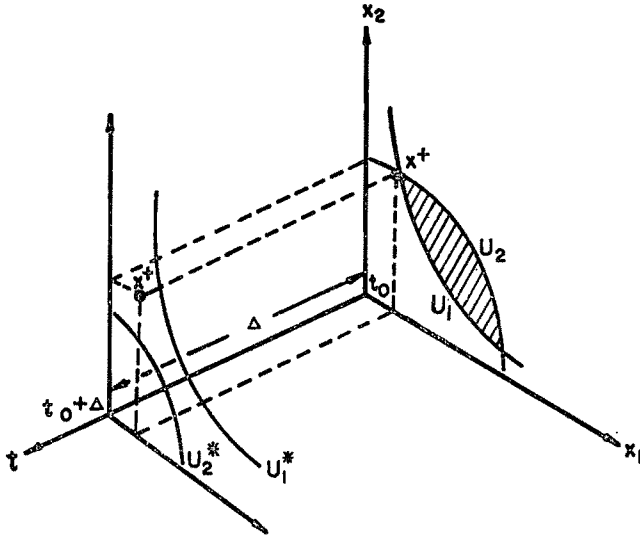
FIGURE 2. A "DYNAMIC" EDGEWORTH BOX WITH FIXED TIME $\Delta$ FOR NEGOTIATIONS

by a positive discount factor. Let $x^+$ be the status quo, and $\Delta$ be the (known) minimum time that can be spent in negotiations.

Any point in the shaded area at time $t_0$ is preferred to $x^+$ for both players. But in order to move away from $x^+$ and find an agreement elsewhere, it takes $\Delta$ time-units. If the utility of $x^+$ at $t_0$ for players 1 and 2 corresponds to the indifference curves $U_1^*$ and $U_2^*$ at $t_0+\Delta$, there may be no incentive to engage in the negotiations for either player as $x^+$ yields a higher utility than any position attainable $\Delta$ units of time thereafter. Notice that, under the usual assumption that each player knows only his own utility function, we cannot say that $x^+$ must be stable even if we assume that $\Delta$ is known by both. It may or it may not, depending upon each player's beliefs concerning his opponent's utility. Only if we assume also perfect knowledge of each other's utilities, can we state that $x^+$ is a stable solution.

The stability of a negotiated solution is a direct consequence of the players' rationality. Therefore, in a timeless world individual rationality is usually sufficient to insure that a negotiated solution will also have certain "welfare" characteristics, namely that it should be efficient.

In a dynamic model this is no longer true. A solution may be stable, yet undesirable under the standard welfare criterion of "efficiency." For analytical purposes, it is possible to redefine efficiency in a dynamic context [2, pp. 13–14], but the essence of the problem does not change. Consider, in Figure 1 the allocation $x^0$ on the contract curve, and assume that it is the status quo at time 0. It is possible that neither party will

be willing to accept such a status quo at time 0, in the hope of forcing the opponent to agree on some other position, more favorable to him than $(x^0, 0)$. However, no such agreement can be forthcoming and the parties will have to take the status quo at some later date, say $T$ time periods thereafter. Clearly, $(x^0, 0)$ is not a stable solution. Both $(x^0, 0)$ and $(x^0, T)$ are "dynamically efficient" according to the new definition, but $(x^0, 0)$ dominates $(x^0, T)$.

Similar arguments can be used to support the second of the two claims made at the beginning of this paper. A bargainer, whose time discount rate is high, will tend to regard his time comparatively more valuable than a bargainer with a low discount rate. Thus, it may be expected that he will be willing to agree on a comparatively less advantageous deal if it allows him to "save" time. For a player with a low discount rate time is a relatively cheap commodity; he will presumably hold out longer in the negotiatory process, and eventually be able to force the opponent to accept his demands. As has been pointed out, this conclusion becomes even stronger if it is assumed that differential bargaining costs are borne by the players. Several examples from the real world can be drawn to support such a view. Collective bargaining disputes provide a good case study. When a strike is called the party who can hold out for the longest time is likely to have it won. Part of the bargaining strategy may consist in convincing the opponents (whether true or not) that "we can hold out longer than you" which usually implies "your time is more valuable than ours."

This observation is not without precedents. Bishop [1] and Foldes [6] have reached sufficiently similar conclusions from models of bargaining that incorporate some elements of both Zeuthen's and Hicks's formulation [12] [8]. Cross's findings are more ambiguous: *ceteris paribus*, the higher each player's discount rate, the less favorable to him will be the negotiated solution; however, the discount rates also affect the players' learning rates in the negotiatory process, and this may reverse the above conclusion.

The experimental study described here aims at providing empirical evidence for the following propositions: (a) the larger the two players' evaluation of time (i.e., a reflection of their time preference structure, as well as any fixed cost incurred in the negotiatory process), the faster will a stable solution be found; (b) the larger the players' evaluation of time, the smaller the likelihood that the negotiated solution will be efficient in the static sense; (c) the larger one player's evaluation of time as compared to his opponent's, the lower his bargaining power, i.e., the less favorable to him will the negotiated solution be.

This paper is a natural extension of the pioneering study by Siegel and Fouraker in 1960 [11].

The experimental context is a bilateral monopoly market, a close replica of the one designed by my predecessors. Siegel and Fouraker's main findings can be summarized as follows:

1. There is a tendency for bargainers to maximize joint payoff by negotiating contracts on the contract curve (Pareto-optimal).

2. Increasing the amount of relevant information available to bargainers increases their tendency to maximize joint payoff; moreover, this leads them to a more equal division of the joint payoff.

3. Consideration of traditional economic forces do not yield an adequate explanation of the negotiated prices. Personal characteristics of the bargainers, namely their aspirations, seem to be important determinants of differential payoff and price.

## II. *Design of Experiments*

The manipulation of a subject's evaluation of time as a control variable in an experimental setup raises some practical difficulties. In theory, one would want to control both the time discount factor in the subject's utility and the fixed cost recurring at each stage of bargaining. While the latter presents no special problems, we are not aware of any acceptable method of manipulating the former in short experimental sessions. It was therefore decided to introduce only a fixed monetary penalty proportional to the number of rounds of bargaining necessary to reach an agreement, and to consider it as a proxy variable for a subject's evaluation of time. The penalty, known in advance to each player, was to be deduced from the final gross payoff on which agreement would be reached. One round of bargaining was defined as a bid of one player, followed by a counter bid of the rival, not leading to agreement. Each bid consisted of a pair "price-quantity" for both buyer and seller.

The payoff to each bargainer was computed as follows,

net payoff = final negotiated payoff
  −(penalty×number of rounds of bargaining prior to agreement).

This method considerably simplifies matters both for the experimenter and for the subjects. No serious unwarranted assumption is introduced in the design by this simplification.

The primary effect of a high penalty should be to reduce the length of the negotiations. This suggests the first hypothesis to be tested in our experiments, namely that the number of rounds of negotiation prior to agreement will be smaller when both participants are bearing a large penalty than if both were incurring a low cost of bargaining. Secondly, it would seem that a high penalty should make more perceptible the difference between a "stable" and an "efficient" (or Pareto-optimal)

solution (in the sense outlined at the beginning of this paper). Thus a high penalty ought to reduce the tendency to negotiate contracts on the Paretian optima. This constitutes our second hypothesis. Thirdly, we shall investigate the effect of a differential penalty on the outcome of the bargaining. The hypothesis to be tested is that an imbalance in the penalty will affect the outcome of the negotiations in favor of the party with the lower cost.

Two additional hypotheses were generated, in which the effect of the differential penalty was combined with the two variables found significant in the Siegel and Fouraker experiments, e.g., the amount of information and the level of aspiration. Both were aimed at giving a stronger validation to the basic hypothesis on the effect of an asymmetric penalty structure on bargaining power.

The model of bilateral monopoly of our experiments is identical to the one used by Siegel and Fouraker. The object of transaction is a unique product, for which no close substitutes are available. As is well known, in such a model there is a unique optimal quantity $Q^*$ for which joint profits are maximized, while the division of profits is determined by the price at which the transaction is made. All profits go to the buyer if the negotiated price is $p_S$, equal to the seller's average cost; all go to the seller if price is $p_B$, equal to the buyer's average revenue. Any transaction involving the optimal quantity $Q^*$ and a price included between $p_S$ and $p_B$ is Pareto-optimal.

Average cost and revenue functions were chosen as follows.

$$\frac{C(q)}{q} = 6 + .4q; \qquad \frac{R(q)}{q} = 20 - q.$$

The associated profit functions were then scaled down by a common proportionality factor so as to yield a maximum joint profit of $10.20, corresponding to an optimal quantity of 9.[2] The profit tables for buyer and seller are given in Tables 1 and 2.

Due to University regulations all subjects were insured a minimum gain at the rate of $1.81 per hour. This feature provided a natural status quo position for the bargainers. Each knew that he could impose the same amount of reward on his opponent by provoking a deadlock. That is, if he felt that his opponent was holding out for an unfair profit, the subject could carry out the implicit threat and impose an equal division of gains at the guaranteed low level.

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[2] The given cost and revenue functions yield a maximum joint profit of $35 at an optimal quantity of 5 units. Profits were scaled down by a factor of 102/350. Moreover, in order to avoid bids in terms of non-integer figures, both quantities and prices were relabelled as shown in the profit tables. Orginally quantities ranged from 1 to 9.5. Prices were relabelled by letters. It should be noticed that the parameters of the cost and revenue functions adopted in this study differ from those used in the Siegel-Fouraker model.

TABLE 1—BUYER'S PROFIT TABLE

(Price in Dollars)

| Quantity | 6.00 | 6.50 | 7.00 | 7.50 | 8.00 | 8.50 | 9.00 | 9.50 | 10.00 | 10.50 | 11.00 | 11.50 | 12.00 | 12.50 | 13.00 | 13.50 | 14.00 | 14.50 |
| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 370 | 356 | 342 | 328 | 314 | 300 | 285 | 270 | 255 | 240 | 225 | 210 | 196 | 182 | 168 | 154 | 140 | 125 |
| 2 | 560 | 539 | 518 | 496 | 475 | 454 | 433 | 412 | 390 | 369 | 348 | 327 | 305 | 284 | 263 | 251 | 230 | 209 |
| 3 | 687 | 660 | 631 | 603 | 575 | 547 | 519 | 490 | 462 | 434 | 406 | 378 | 350 | 322 | 294 | 266 | 238 | 210 |
| 4 | 750 | 715 | 680 | 645 | 610 | 575 | 540 | 505 | 470 | 435 | 400 | 365 | 330 | 295 | 260 | 225 | 190 | 165 |
| 5 | 933 | 890 | 845 | 800 | 755 | 710 | 665 | 620 | 575 | 530 | 485 | 440 | 395 | 350 | 305 | 260 | 215 | 170 |
| 6 | 940 | 890 | 840 | 790 | 740 | 690 | 640 | 590 | 540 | 490 | 440 | 390 | 340 | 290 | 240 | 190 | 140 | 90 |
| 7 | 1030 | 970 | 915 | 855 | 800 | 740 | 685 | 625 | 570 | 510 | 455 | 400 | 340 | 285 | 225 | 170 | 90 | 25 |
| 8 | 1200 | 1140 | 1075 | 1015 | 950 | 890 | 825 | 760 | 595 | 630 | 570 | 505 | 440 | 380 | 315 | 250 | 190 | 130 |
| 9 | 1300 | 1230 | 1160 | 1090 | 1020 | 950 | 880 | 810 | 740 | 670 | 600 | 530 | 460 | 390 | 320 | 250 | 180 | 110 |
| 10 | 1340 | 1260 | 1185 | 1105 | 1030 | 950 | 875 | 800 | 720 | 640 | 560 | 485 | 410 | 335 | 255 | 180 | 100 | 25 |
| 11 | 1355 | 1270 | 1185 | 1100 | 1015 | 930 | 845 | 760 | 685 | 600 | 515 | 430 | 345 | 260 | 175 | 90 | 5 | -80 |
| 12 | 1360 | 1270 | 1180 | 1090 | 1000 | 910 | 820 | 730 | 640 | 550 | 460 | 370 | 280 | 190 | 100 | 10 | -80 | -170 |
| 13 | 1375 | 1275 | 1175 | 1075 | 975 | 875 | 775 | 675 | 575 | 475 | 375 | 275 | 175 | 75 | -25 | -125 | -225 | -325 |
| 14 | 1375 | 1270 | 1160 | 1055 | 945 | 840 | 730 | 625 | 515 | 410 | 300 | 200 | 90 | -20 | -125 | -235 | -340 | -450 |
| 15 | 1350 | 1240 | 1125 | 1015 | 900 | 790 | 675 | 565 | 450 | 340 | 330 | 115 | 0 | -110 | -225 | -340 | -450 | -560 |
| 16 | 1340 | 1220 | 1100 | 975 | 850 | 730 | 610 | 485 | 360 | 250 | 125 | 0 | -125 | -245 | -360 | -480 | -505 | -630 |
| 18 | 1300 | 1170 | 1040 | 910 | 790 | 660 | 540 | 390 | 260 | 130 | 0 | -125 | -250 | -380 | -510 | -635 | -760 | -890 |
| 18 | 1250 | 1110 | 970 | 830 | 695 | 560 | 420 | 280 | 140 | 0 | -135 | -270 | -405 | -540 | -630 | -815 | -950 | -1040 |

The profits are derived from the demand curve for your firm.

TABLE 2—SELLER'S PROFIT TABLE

(Price in Dollars)

| Quantity | 6.00 | 6.50 | 7.00 | 7.50 | 8.00 | 8.50 | 9.00 | 9.50 | 10.00 | 10.50 | 11.00 | 11.50 | 12.00 | 12.50 | 13.00 | 13.50 | 14.00 | 14.50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
| 1 | −11 | 3 | 17 | 31 | 45 | 59 | 73 | 87 | 101 | 115 | 129 | 145 | 159 | 173 | 187 | 201 | 215 | 229 |
| 2 | −29 | −8 | 13 | 34 | 57 | 78 | 100 | 121 | 143 | 164 | 185 | 206 | 228 | 249 | 271 | 292 | 313 | 334 |
| 3 | −46 | −18 | 11 | 40 | 68 | 96 | 124 | 153 | 181 | 209 | 237 | 265 | 293 | 321 | 349 | 377 | 405 | 433 |
| 4 | −75 | −40 | −4 | 30 | 64 | 101 | 135 | 172 | 206 | 243 | 280 | 314 | 351 | 385 | 422 | 456 | 490 | 527 |
| 5 | −103 | −60 | −18 | 25 | 67 | 110 | 152 | 195 | 237 | 280 | 322 | 385 | 427 | 470 | 512 | 555 | 597 | 640 |
| 6 | −140 | −90 | −45 | 0 | 50 | 95 | 145 | 190 | 240 | 285 | 335 | 380 | 430 | 485 | 535 | 580 | 630 | 675 |
| 7 | −184 | −130 | −70 | −10 | 45 | 105 | 160 | 220 | 275 | 335 | 390 | 450 | 505 | 560 | 620 | 575 | 730 | 790 |
| 8 | −231 | −171 | −102 | −41 | 30 | 92 | 157 | 220 | 285 | 347 | 410 | 480 | 545 | 610 | 672 | 735 | 800 | 862 |
| 9 | −285 | −215 | −140 | −70 | 0 | 70 | 140 | 210 | 280 | 350 | 420 | 490 | 560 | 630 | 700 | 770 | 840 | 915 |
| 10 | −372 | −300 | −220 | −145 | −65 | 10 | 90 | 165 | 245 | 320 | 400 | 475 | 555 | 630 | 710 | 785 | 865 | 940 |
| 11 | −447 | −360 | −275 | −190 | −85 | 5 | 85 | 165 | 250 | 335 | 420 | 505 | 590 | 675 | 760 | 850 | 935 | 1020 |
| 12 | −493 | −400 | −310 | −215 | −125 | −30 | 60 | 155 | 245 | 340 | 430 | 525 | 615 | 710 | 800 | 895 | 985 | 1080 |
| 13 | −558 | −458 | −348 | −258 | −158 | −58 | 42 | 142 | 242 | 342 | 442 | 542 | 640 | 740 | 840 | 941 | 1042 | 1140 |
| 14 | −657 | −555 | −450 | −335 | −220 | −115 | 0 | 115 | 220 | 330 | 440 | 550 | 665 | 780 | 895 | 1010 | 1125 | 1230 |
| 15 | −750 | −620 | −500 | −390 | −280 | −170 | −60 | 50 | 160 | 270 | 380 | 490 | 600 | 720 | 840 | 960 | 1080 | 1200 |
| 16 | −837 | −690 | −565 | −445 | −320 | −185 | −65 | 20 | 140 | 260 | 385 | 510 | 635 | 755 | 875 | 1000 | 1120 | 1240 |
| 17 | −924 | −800 | −670 | −540 | −410 | −290 | −160 | −30 | 100 | 230 | 360 | 490 | 620 | 750 | 880 | 1030 | 1160 | 1290 |
| 18 | −1027 | −920 | −780 | −640 | −500 | −360 | −220 | −80 | 60 | 200 | 340 | 480 | 620 | 760 | 930 | 1040 | 1180 | 1320 |

The profits are derived from the supply curve of your firm.

A total of 50 bargaining pairs were observed in five different Experimental Sessions. The experiment was designed according to the following scheme.[3]

INFORMATION STRUCTURE

|  | | Incomplete | | Complete/Incomplete | | |
|---|---|---|---|---|---|---|
|  | | Level of Aspiration | | Level of Aspiration | | |
|  | | High | Not controlled | High | Not controlled | |
| Symmetrical | High | — | 10 | — | — | 10 |
| penalty | Low | $\theta$ | 10 | — | — | 10 |
| Asymmetrical | Differential | $1\theta$ | 10 | — | 10 | 30 |
| penalty | | | | | | |
|  | | 10 | 30 | — | 10 | 50 |

### III. *Results of Experiments*

In this section I report on the experimental studies that were carried out to test the first two hypotheses developed in the previous section.

The first hypothesis predicts that the negotiations in which both participants are incurring large costs of bargaining will be shorter in duration than the negotiations in which there is no penalty levied on either party. Two sets of experiments were conducted in order to test this hypothesis (referred to as Experimental Sessions I and II). Ten bargaining pairs were run in each set of experiments. Experimental Session I was an exact replica of the Siegel-Fouraker experiments under incomplete information, except for the parameters used to generate the profit tables. No penalty was assessed on either player. Experimental Session II differed from the previous one in that a penalty of 10 cents per round of bargaining was imposed on both players.[4] All subjects in Experimental Sessions I and II bargained under conditions of incomplete information, i.e., they had access only to their own profit matrix and knew only their own penalty. The observations from Experimental Sessions I and II are summarized in Tables 3 and 4.

All ten pairs participating in Experimental Session I were able to reach an agreement within the hour time limit. Only eight pairs out of

[3] For detailed information on the experimental procedures, see [3]. The sample included 100 subjects, all students at the University of California in Berkeley. Each subject was randomly assigned to only one experiment. In order to maintain a minimum degree of homogeneity in the sample, the subjects were selected among the following majors: business administration, economics and engineering. The great majority were upper division undergraduates; all of them males, except two.

[4] This amount was arrived at after interviewing subjects participating in pilot-experiments in which various amounts were used. Ten cents appeared to be a reasonable figure because it was large enough so that it would not be ignored but not excessive in relation to the negotiable payoffs.

TABLE 3—CONTRACTS NEGOTIATED BY BARGAINING PAIRS IN EXPERIMENTAL SESSION I

| Number of Transactions | Quantity | Price | Gross Profits | | | |
|---|---|---|---|---|---|---|
| | | | Buyer | Seller | Joint Payoff | |
| 25 | 10 | 12.50 | 3.35 | 6.30 | 9.65 | N |
| 32 | 9 | 10.50 | 6.70 | 3.50 | 10.20 | O |
| 19 | 9 | 11.00 · | 6.00 | 4.20 | 10.20 | O |
| 8 | 9 | 10.50 | 6.75 | 3.50 | 10.20 | O |
| 50 | 10 | 11.00 | 5.60 | 4.00 | 9.60 | N |
| 21 | 9 | 10.00 | 7.40 | 2.80 | 10.20 | O |
| 20 | 9 | 11.00 | 6.00 | 4.20 | 10.20 | O |
| 12 | 9 | 11.00 | 6.00 | 4.20 | 10.20 | O |
| 38 | 9 | 11.00 | 6.00 | 4.20 | 10.20 | O |
| 12 | 9 · | 12.00 | 4.60 | 5.60 | 10.20 | O |
| Mean 23.7 | 9.2 | 11.05 | 5.84 | 4.25 | 10.09 | |

Buyer's gross payoff larger than Seller's   8 pairs
Seller's gross payoff larger than Buyer's   2 pairs
                                            ——
                                            10

ten reached a settlement in Experimental Session II; in two cases the negotiations came to an end because one player decided to withdraw from the bargaining. The means in Table 4 were calculated omitting these observations.

The mean number of transactions in Experimental Session I was 23.7

TABLE 4—CONTRACTS NEGOTIATED BY BARGAINING PAIRS IN EXPERIMENTAL SESSION II

| Number of Transactions | Quantity | Price | Gross Profits | | | |
|---|---|---|---|---|---|---|
| | | | Buyer | Seller | Joint Payoff | |
| 5 | 8 | 11.00 | 5.70 | 4.10 | 9.80 | N |
| 2 | 10 | 12.00 · | 4.10 | 5.55 | 9.65 | N |
| 22 | 9 | 11.00 | 6.00 | 4.20 | 10.20 | O |
| 14 | 9 | 10.50 | 6.70 | 3.50 | 10.20 | O · |
| 20 | 9 | 10.00 | 7.40 | 2.80 | 10.20 | O |
| 3 | 9 | 10.50 | 6.70 | 3.50 | 10.20 | O |
| 14 | 9 | 9.50 | 8.10 | 2.10 | 10.20 | O |
| 4 | 9 | 10.00 | 7.40 | 2.80 | 10.20 | O |
| *20 | —— | —— | Quit | — | hourly rate N | |
| *54 | — | —— | —— | Quit | hourly rate N | |

(*) Means do not include these observations
Buyer's gross payoff larger than Seller's   7 pairs
Seller's gross payoff larger than Buyer's   1 pair
Status quo (quits)   2 pairs
——
10

while in Experimental Session II it was 10.5. Thus, the observed results are in the right direction to support the hypothesis.

We tested the null hypothesis that the two samples of observations on the length of each experiment come from the same population, against the alternative hypothesis that they belong to two populations, one of which is stochastically larger than the other. The appropriate test is the (nonparametric) Mann-Whitney U test, defined by

$$U = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - R_1,$$

$n_1 =$ number of observations in the smaller sample,
$n_2 =$ number of observations in the larger sample,
$R_1 =$ sum of the ranks assigned to observations in sample of size $n_1$.

We find $U = 15$ with $n_1 = 8$ and $n_2 = 10$. The critical value of the test at level $\alpha = .025$ is $U = 17$ [see 10, Tables K and I]. We can, therefore, reject the null hypothesis, and conclude that the results of Experimental Sessions I and II strongly support the hypothesis that the cost of bargaining influences the length of time necessary to reach an agreement in situations of bilateral monopoly.

The second hypothesis predicts that the frequency of Pareto-optimal contracts will be lower, the higher the penalty assessed on the two contendents. In Experimental Session I (Table 3) all ten pairs reached an agreement, eight of which at the quantity that maximizes joint profit, $Q^* = 9$; the remaining two pairs came to a solution in correspondence to the quantity $Q = 10$, i.e., only one unit away from the optimal quantity. In Experimental Session II, however, two pairs failed to reach any agreement; in one case it was the Seller who quit, in the other case it was the Buyer.[5] Of those who came to a negotiated solution, six maximized their joint gross payoff, and two settled for quantities only one unit away from $Q^* = 9$.

The results appear to be in the direction predicted by the theory, but not so convincingly as in the previous hypothesis. For instance, we find surprisingly high the number of pairs that reached a Pareto-optimal position (in gross terms) in Experimental Session II (6 out of 10).

An *ad hoc* binomial test based on the classification of all twenty pairs in the two Sessions I and II as "optimal" (*O*) and "non-optimal" (*N*) (according to the size of the negotiated joint payoff) suggests that the observations from Experimental Session II do not belong to the same

[5] Actually this pair closed the bargaining on a contract which called for a raw loss of $3.60 for the Buyer. The Buyer explained that his penalty had made it uneconomical to continue bargaining after 20 rounds of negotiations. Rather than quit he accepted a loss presuming that he would not be asked to pay it, and that, instead, he would receive the guaranteed hourly rate. He hoped to obtain a side-payment from his opponent after the session was over.

population as the observations from Experimental Session I at a level of significance equal to 87.8 per cent. This inference supports the underlying theory, although, admittedly, in a somewhat more modest fashion than was initially expected.[6] Additional testing is therefore needed to provide conclusive evidence in this hypothesis.

## IV. Asymmetrical Penalty Structure

I shall now discuss the effect of introducing an asymmetrical penalty structure in our experimental setup.

A more critical look at the results of Experimental Sessions I and II will help to rationalize the design of the three remaining sets of experiments. In those two sessions the Buyer's average profit $(\bar{\pi}_B)$ was clearly higher than the Seller's $(\bar{\pi}_S)$. In Session I the Buyer did better than the Seller 8 times out of 10; average profits were $\bar{\pi}_B = 5.84$ vs. $\bar{\pi}_S = 4.25$. In Session II, the Buyer did better than the Seller 7 times out of 8 pairs in which agreement was found; average profits were $\bar{\pi}_B = 6.51$ vs. $\bar{\pi}_S = 3.51$.

These data suggest that the game is substantially biased in favor of the Buyer. The imbalance is so clear that there is no need to resort to statistical testing for confirmation. The reason appears to be due to an asymmetry of the profit matrices. In fact, the geometrical center of the profit table does not coincide with the equal division of joint profits; the former occurs at a price of $10.25, while the latter coincides with a price of $11.65. Contrary to any postulate on the "independence of irrelevant alternatives," the tendency toward negotiating contracts in the vicinity of the geometrical center of the profit tables seems to have been remarkably strong. At the geometrical center of the matrices, the Buyer's profit is more than twice the Seller's. This bias was not intentionally designed in the experiment, but, a posteriori, it turned out to be a useful feature for the following reasons: (1) it provides an easy way of testing the relevance of "irrelevant alternatives" in bargaining situations;[7] (2) it provides a "natural" design for the assessment of differential penalties on the two bargainers, as is indicated in what follows.

[6] It would be possible to test the same hypothesis on the basis of the data on the joint profits agreed upon by each pair. This procedure would however raise some problems due to the difficulty of comparing gross joint profits with net figures without due account for the number of transactions in each bargain.

[7] This can be done by replicating Experimental Sessions I and/or II with the same set of profit tables, except for the range of prices that should be modified as follows: smallest price equal to $8.00, largest price equal to $16.50. This amounts to chopping off the first four columns of the profit tables, and adding four at the end. The geometrical center is thus shifted at the price $12.25, in correspondence of which the Seller's profit is slightly larger than the Buyer's. If such a modified game shifts the bias in favor of the Seller, as I would strongly suspect at this point, it will contribute a blatant violation of the so-called independence of irrelevant alternatives. It has been suggested to me that experienced bargainers may not fall into this trap so easily as the inexperienced subjects that were used in our experiments. This may be true, but, as yet, no evidence is available to confirm it.

TABLE 5—CONTRACTS NEGOTIATED BY BARGAINING PAIRS IN EXPERIMENTAL SESSION III

| Number of Transactions | Quantity | Price | Gross Profits | | |
|---|---|---|---|---|---|
| | | | Buyer | Seller | Joint Payoff |
| 28 | 11 | 12.00 | 3.45 | 5.90 | 9.35 *N* |
| 12 | 9 | 11.50 | 5.30 | 4.90 | 10.20 *O* |
| 16 | 9 | 11.50 | 5.30 | 4.90 | 10.20 *O* |
| 21 | 9 | 11.00 | 6.00 | 4.20 | 10.20 *O* |
| 23 | 9 | 12.50 | 3.90 | 6.30 | 10.20 *O* |
| 12 | 10 | 10.50 | 6.40 | 3.20 | 9.60 *N* |
| 9 | 9 | 12.00 | 4.60 | 5.60 | 10.20 *O* |
| 16 | 9 | 11.50 | 5.30 | 4.90 | 10.20 *O* |
| *57 | — | — | Quit | — | hourly rate *N* |
| *35 | — | — | Quit | — | hourly rate *N* |
| Mean 15.9 | 9.38 | 11.56 | 5.04 | 4.99 | 10.03 |

(*) Means do not include these observations

Buyer's gross payoff larger than Seller's   5 pairs
Seller's gross payoff larger than Buyer's   3 pairs
Status quo (quits)   2 pairs
———
10

The hypothesis to be tested in Experimental Session III states that an imbalance in the induced bargaining costs will affect the negotiations in favor of the party who has been assessed the lower penalty. We decided to assess the high penalty to the Buyer and the low penalty to the Seller. According to the theory this will tend to shift the negotiated contracts towards a more equitable equilibrium, by counterbalancing the built-in bias in favor of the Buyer. Ten pairs of subjects participated in Experimental Session III. The session was conducted exactly in the same manner as the previous two, and identical profit tables were used. The only difference concerned the size of the penalty. Subjects who were to play the role of the Buyer were assessed a penalty of 10¢ per round; those playing the role of the Seller were told that they would incur no cost of bargaining. As in the previous experiments, no subject was given any information on the penalty being incurred by his opponent, nor on his profit table. The results are summarized in Table 5. Two out of the ten bargaining pairs were unable to reach an agreement. In both cases it was the Buyer who quit the negotiations.

At first glance it appears that the results are in the direction predicted by the theory. The average gross profit of Buyer and Seller is almost equal, showing the Seller's substantial improvements over the previous sessions. The mean number of transactions is roughly half-way between the means of Sessions I and II. Statistical testing is performed by comparing the final gross payoffs of either the Buyer or the Seller in Experi-

mental Session III with the respective payoffs attained in Sessions I and II. The results of the first two experiments can be pooled together as in both we used a symmetrical penalty structure.

The Mann-Whitney U-test with sample sizes $n_1=8$ and $n_2=18$ is used to test the null hypothesis that the two samples are drawn from the same population, against the alternative hypothesis that the parent populations are different and that one is stochastically larger than the other. The value of the U-statistic is given by $U=31$ which is significant at the 97.5 per cent confidence level.

It is thus confirmed that the asymmetry in the penalty structure influences the balance of bargaining power; in bilateral negotiations the higher one's penalty relative to the rival's, the less advantageous one's final position (in gross terms) at the end of the negotiatory process. In this set of experiments the Buyer's average gross profit, $\bar{\pi}_B=5.04$, is still slightly larger than the Seller's, $\bar{\pi}_S=4.99$, but the difference has become almost insignificant. Moreover, the Buyer did better than the Seller in 5 out of 8 sample observations.[8]

Finally, it is worthwhile noticing that, in the two cases in which a deadlock was provoked, it was the Buyer who chose to do so. In both cases the bargainers had already gone through prolonged negotiations (57 rounds of bargaining in one, and 35 in the other). This observation is also in accordance with the underlying theory.

## V. *Further Experiments*

Experimental Sessions IV and V were designed to provide additional confirmation of the effect of asymmetric bargaining costs under different institutional arrangements suggested in the Siegel and Fouraker study.

The first set of experiments was conducted to determine the influence of varying degrees of information. The hypothesis to be tested, a straightforward extension of a parallel hypothesis by Siegel and Fouraker, originally due to Schelling [9], is that, under conditions of complete-incomplete information, the bargainer who is given complete information will come out with a smaller gross payoff than he would have had he possessed only incomplete information. This will occur as the latter will realize that it may be difficult for his opponent to see the "moralistic or legalistic" merits of the fifty-fifty contract, and therefore he may feel obliged to make concessions to avoid a stalemate.

Experimental Sessions III and IV were used to test this hypothesis. Ten bargaining pairs participated in Experimental Session IV. The procedures and the profit tables were the same as in the previous experiments. The Buyers were assigned a penalty of 10¢, and the Sellers a

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[8] It goes without saying that the Seller's average net profit is substantially higher than the Buyer's, due to the fact that Sellers were charged a zero penalty, while the Buyers were assessed 10¢ per round of bargaining.

TABLE 6—CONTRACTS NEGOTIATED BY BARGAINING PAIRS IN EXPERIMENTAL SESSION IV

| Number of Transactions | Quantity | Price | Gross Profits | | | |
|---|---|---|---|---|---|---|
| | | | Buyer | Seller | Joint Payoff | |
| 26 | 9 | 11.50 | 5.30 | 4.90 | 10.20 | O |
| 29 | 10 | 11.00 | 5.60 | 4.00 | 9.60 | N |
| 23 | 9 | 12.50 | 3.90 | 6.30 | 10.20 | O |
| 8 | 9 | 12.50 | 4.60 | 5.60 | 10.20 | O |
| 17 | 9 | 11.00 | 6.00 | 4.20 | 10.20 | O |
| 18 | 9 | 12.00 | 4.60 | 5.60 | 10.20 | O |
| 1 | 10 | 12.00 | 4.10 | 5.55 | 9.65 | N |
| 19 | 9 | 12.50 | 3.90 | 6.30 | 10.20 | O |
| * 7 | — | — | Quit — | | hourly rate | N |
| *25 | — | — | negotiations called off after one hour | | hourly rate | N |

(*) Means do not include these observations

Buyer's gross payoff larger than Seller's    3 pairs
Seller's gross payoff larger than Buyer's    5 pairs
Status quo (quits)    1 pair
No agreement    1 pair
—
10

zero penalty. The Buyer had his own profit table, while the Seller was given the Buyer's profit table as well as his own (actually the two tables were combined in one larger table to facilitate the reading). As in other sessions, no subject was given any information concerning the penalty or information conditions assigned to his opponent. In the Siegel-Fouraker experiments, however, the subjects with complete information were told that their opponent had access only to their own profit table. The difference turns out to be rather significant and appears to have interesting theoretical implications. The observations from Experimental Session IV are shown in Table 6. In one case the two bargainers were unable to reach any agreement at the end of the period assigned to them. In another case no agreement was negotiated as the Buyer quit.

According to our hypothesis, one should expect the average gross payoff to the Seller in Session III to be larger than in Session IV. As can be observed from Tables 5 and 6 the experimental data yield a diametrically opposite relation. The Seller's mean payoff in Session IV is $5.31; the equivalent figure from Session III was $4.99. Moreover, the Seller did better than the Buyer 5 times out of 8 in Session IV, while in Session III he had done better only 3 times in 8.

This finding suggests an interesting speculation. The hypothesis advanced by Siegel and Fouraker predicts that the bargainer with incomplete information may have an advantage over a rival with complete

information as the latter will realize that the opponent may be unable to see the merits of a "fair" agreement. In Experimental Session IV, however, the bargainers with complete information, namely the Sellers, were not told that their opponents had a more limited amount of information. They were free to believe whatever they saw fit. Thus they were not in a position to make this type of rationalization.[9] It becomes, therefore, reasonable to suspect that in these circumstances the Sellers would take full advantage of their position, without any incentive to make large concessions.

The results of Experimental Session IV may be reinterpreted along these lines, and, insofar as our speculation can be regarded as a testable hypothesis, they seem to provide it with some support, although not statistically significant. These observations do not in any way contradict Siegel and Fouraker's findings; quite the contrary, our speculation suggests that "a little less" information may be preferable to "a little more." This is quite in line with their results, and also in agreement with Schelling's original idea.

The last set of data was generated in Experimental Session V. Here, both the individual level of aspiration and the cost of bargaining were used as control variables. The session was directed at providing additional support to our basic hypothesis on the effects of differential penalties in the presence of high—artificially induced—level·of aspiration. The conditions on the penalty and the amount of information were the same as in Session III. That is, all subjects bargained with incomplete information; the Buyer was penalized 10¢ per round of negotiation, but there was no penalty on the Seller. A high level of aspiration was induced in all the subjects playing the role of the Seller according to a procedure similar to the one used by Siegel and Fouraker.[10]

Our hypothesis is a direct extension of another basic finding of the Siegel-Fouraker study: the bargainer with a high aspiration level will

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[9] It is also true, however, that the "perfectly fair price" of $11.65 which would yield a fifty-fifty split of the joint profits, was not available in the profit tables. The lack of a "prominent" solution (in Schelling's terms) may therefore contribute to the explanation of why such a rationalization was not made. I owe this observation to a referee's comment.

[10] All the subjects acting as Sellers in Experimental Session V were given the following short notice, in addition to the information sheet and payoff matrix.

"*Attention:* You will be given a chance to earn money in addition to your regular payoff according to the following scheme:

—If your final payoff is between $5.00 and $5.50 you will be given a chance to earn a bonus of $2.00.

—If your final payoff is between $5.51 and $6.00 you will be given a chance to earn a bonus of $3.00.

—If your final payoff is more than $6.00 you will be given a chance to earn a bonus of $4.00."

This notice provided the Seller with a figure upon which to base his aspirations. Of course, he did not know that this level was higher than what he would have been expected to attain without the extra inducement. If at the end of each experiment the Seller's payoff exceeded the above amounts, he was asked to guess his opponent's gross payoff within a ±10¢ range. A correct guess would entitle him to the bonus.

TABLE 7—CONTRACTS NEGOTIATED BY BARGAINING PAIRS IN EXPERIMENTAL SESSION V

| Number of Transactions | Quantity | Price | Gross Profits | | |
|---|---|---|---|---|---|
| | | | Buyer | Seller | Joint Payoff |
| 27 | 10 | 12.50 | 3.35 | 6.30 | 9.65    N |
| 4 | 11 | 11.00 | 5.15 | 4.20 | 9.35    N |
| 12 | 9 | 12.50 | 3.90 | 6.30 | 10.20    O |
| 39 | 8 | 11.50 | 5.05 | 4.80 | 9.85    N |
| 7 | 9 | 12.50 | 4.60 | 5.60 | 10.20    O |
| 20 | 9 | 10.50 | 6.70 | 3.50 | 10.20    O |
| 12 | 10 | 11.50 | 4.85 | 4.75 | 9.60    N |
| 13 | 9 | 12.50 | 3.90 | 6.30 | 10.20    O |
| 4 | 8 | 12.50 | 3.80 | 6.10 | 9.90    N |
| *57 | — | — | Quit | — | hourly rate  N |
| Mean 15.3 | 9.22 | 11.83 | 4.59 | 5.32 | 9.91 |

(*) Means do not include these observations

Buyer's gross payoff larger than Seller's    4 pairs
Seller's gross payoff larger than Buyer's    5 pairs
Status quo (quit)    1 pair
——
10

be able to force a negotiated solution more favorable to him than would be realized if both players had comparable aspiration. We expect the two control variables to cumulate their effects; thus, the average gross profit to the Seller should be higher in Session V (in which both the induced aspiration level and the asymmetry of the penalty structure act in the direction of strengthening his bargaining power) than in Session III (in which only the penalty structure acted in that direction). The experimental data are shown in Table 7. Nine pairs of bargainers reached an agreement within an hour. In one case the Buyer quit, provoking a deadlock after 57 rounds of negotiation.

The average gross profit to the Seller is \$5.32 against a figure of \$4.99 in Session III. The Seller's gross profit was higher than the Buyer's 5 times out of 9. The results are in the direction that supports the hypothesis. Applying the Mann-Whitney U-test to the two samples of gross profit earned by the Sellers in Sessions III and IV, we find that the null hypothesis cannot be rejected. The experimental data are not sufficient to support the hypothesis, although they are in the direction predicted by the theory.

## VI. Summary

The data generated in the five Experimental Sessions provide some validation to all the hypotheses discussed at the outset. The introduc-

tion of a penalty as a proxy for the cost of bargaining drastically cuts the time required to reach an agreement (measured in rounds of unfinished negotiations). Moreover, it reduces the frequency of contracts on the Paretian optima.

An asymmetric penalty structure gives a strong advantage to the player who is assessed the lower penalty. This result was found in all the three sets of experiments designed with such asymmetries; it is confirmed at a more aggregate level by pooling all the observations on the individual final payoffs in two large groups: (1) those generated in Sessions I and II in which the penalty structure was symmetrical; (2) those obtained in the last three sessions, in which the Buyer was assessed a penalty of 10¢ per round of negotiation, and the Seller a zero penalty.

The data below show the frequencies of "wins" and "losses" between the two bargainers, classified in the two groups.

|  | Equal penalty | Differential penalty | |
|---|---|---|---|
| $\pi_B > \pi_S$ | 15 | 12 | 27 |
| $\pi_B < \pi_S$ | 3 | 13 | 16 |
|  | 18 | 25 | 43 |

The built-in bias in favor of the Buyer has a decisive effect on the 18 pairs run under conditions of equal penalty (Experimental Sessions I and II); only three pairs negotiated an agreement in which the final payoff to the Seller was larger than the Buyer's; in all other cases the Buyer came out better off than his opponent. With an asymmetrical penalty structure (Sessions III, IV, V) the game becomes, practically, a fair one: half of the time the agreement was to the Buyer's advantage, half of the time it turned out favorable to the Seller. Previous tests have already indicated that the asymmetry of the penalty structure has a major impact on the negotiated solution. A $\chi^2$-test performed on the $2 \times 2$ aggregated classification gives a strong confirmation to those findings. The theoretical frequencies, under the assumption of complete independence, are given by

|  | Equal penalty | Differential penalty | |
|---|---|---|---|
| $\pi_B > \pi_S$ | 11.3 | 15.7 | 27 |
| $\pi_B < \pi_S$ | 6.7 | 9.3 | 16 |
|  | 18 | 25 | 43 |

The test statistic is $\sum_{ij}(E_{ij}-0_{ij})^2/E_{ij}=5.62$, distributed as a $\chi^2$ with one degree of freedom. The critical value at level $\alpha=0.02$ is equal to 5.41. The null hypothesis can therefore be rejected at the 98 per cent confidence level.

A different hypothesis already tested on disaggregated data suggests that the observations on the Seller's gross payoff in group (2) should be stochastically larger than those belonging to group (1). Applying the Mann-Whitney non-parametric U-test, with $n_1=18$ and $n_2=25$, one obtains the auxiliary $z$-statistic, defined as follows [10],

$$z = \frac{U - n_1 n_2/2}{\sqrt{n_1 n_2(n_1 + n_2 + 1)/12}} = 3.47.$$

With a sample statistic $z=3.47$ the null hypothesis can be safely rejected at the 99.997 per cent confidence level, providing additional confirmation that the two samples come from different populations.

The theory provides also some indications on which player is more likely to provoke a deadlock in the negotiations, i.e., force the status quo and, thus, equal payments at the guaranteed low level. *Ceteris paribus*, it will be the player whose value of time is—comparatively—higher. The experimental data are in apparent agreement with such theoretical expectations. In the two sessions in which the penalty structure was symmetrical, two pairs quit before reaching an agreement: in one case it was the Buyer, in the other it was the Seller. In the three sessions characterized by asymmetrical penalties four pairs failed to reach an agreement: in all four the status quo was chosen by the Buyer, i.e., the party who was incurring the larger penalty.

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# TARIFFS AND TRADE IN GENERAL EQUILIBRIUM

## By Bo Södersten and Karl Vind*

The theory of tariffs has a long history. It figured prominently in the classical tradition, spurred on by the controversy over free trade and protectionism. The interest in tariff theory has also been kept alive within a modern, neoclassical framework. Few are the years that have not seen some kind of contribution to the theory of tariffs.

Before burdening the public with a new article on the subject, an explanation might therefore be warranted. Even though much has been published, and even though the problem in its essence should not be difficult to deal with, we think that we are justified in saying that no simple yet general treatment of the problem has been given. This being the case, an attempt at solving the question of the effects of tariffs within the context of the standard trade model seems justifiable.

Now, what one means by the theory of tariffs is not completely clear. In fact, it consists of at least two quite distinct branches. The first branch deals with the effects of tariffs on prices, economic welfare, etc., under fully competitive conditions. The second branch discusses tariffs in the presence of market imperfections and distortions, and has so far dealt only with the fairly limited question of whether the tariff is a legitimate policy measure for dealing with a distortion, and with comparing tariffs with other means for correcting the distortions. We are, in this paper, concerned with the first type of tariff theory.

Even within this first type there typically exists a distinct cleavage between what might be called the positive theory of tariffs and the welfare side of the theory, between the effects of tariffs on prices and income distribution on the one hand, and the question of the optimum tariff on the other. Most economists would probably agree that such a cleavage has to exist because of the nature of the problems involved.

This point of view, while not being directly mistaken, is nonetheless superficial and has been one of the reasons why economists have tended to treat the theory of tariffs in a partial and incomplete fashion, relegating to different compartments variables that should have been treated at one and the same time. We will treat our problem within the confines of the standard two-by-two-by-two trade model, i.e., a model

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with two countries, producing and consuming two goods, using two factors of production.

One of the points of our paper is that we simultaneously deal with all the relevant variables in the general equilibrium framework—to be specific, that we solve the system with respect both to prices and to the real national income. We furthermore demonstrate that the effects of tariffs on the terms of trade and on the home market price ratio are neat and unambiguous, that a tariff always will improve a country's terms of trade and always will make imports more expensive, except in the limiting case of complete adaptability, where relative prices do not change. The difference between our results and accepted theory on this score, we maintain, depends on the fact that earlier writers have confounded a redistribution problem with the effects of tariffs and thereby complicated the analysis in an unnecessary way. A corollary of our result for the home market price ratio is that the effects on the income distribution are also clear-cut and that the Stolper-Samuelson theorem holds without qualifications in this regard. We then go on to treat the effects of a tariff on the national income in real terms and derive a new formula for the optimum tariff.

As we want to isolate the effects of tariffs on the two trading economies, we have constructed a very simple type of general equilibrium model that still is comprehensive and able to reflect the interrelationships that we regard as essential. One obvious difficulty is that if the model is too large one cannot solve it for the general case, and thus cannot get qualitative results. In order to get a manageable model, it has to be stripped down to the barest essentials while preserving its general equilibrium character. We have tried to do this by compressing the model to an equation system of eleven variables in eleven unknowns.

It is, however, not possible to say a priori what are essential features. Another model, with other assumptions, might give results that differ significantly from the ones derived from this model. It can only be said that the present model is one of the simplest types of general equilibrium models that can be constructed, and that one can hope that the simplifying assumptions on which it is built will not turn out to be critical in the sense that altering them would lead to significantly different results. At least our model is built on explicit theorizing; there are no hidden assumptions, and the meaning of the variables involved should be clear enough.

## I. *The Model and Its Solution*

Let us then numerate the variables used and set out the model. $S_{1m}$ and $S_{1x}$ stand for production of importables and exportables in Country I; $S_{2m}$ and $S_{2x}$ mean analogous things for Country II. $C_{1m}$ and

$C_{1x}$ mean consumption of importables and exportables in Country I; $C_{2m}$ and $C_{2x}$ denote analogous magnitudes in Country II. $Y_1$ and $Y_2$ denote national income in the respective countries. $P$ is equal to the price of Country I's export good (i.e., Country I's terms of trade), while we let the price of the other good—i.e., Country I's import good and Country II's export good—equal one. Finally, $t_1$ and $t_2$ are the tariff rates in the respective countries.

The model, then, consists of the following system of eleven equations.

(1) $$Y_1 = S_{1m} + PS_{1x} + t_1 C_{1m}$$

(2) $$Y_2 = S_{2x} + PS_{2m} + Pt_2 C_{2m}$$

These two equations are definitions that show that the national incomes in the two countries equal total production plus the tariff revenue.

(3) $$C_{2m} - S_{2m} = S_{1x} - C_{1x}$$

(4) $$C_{1m} - S_{1m} = S_{2x} - C_{2x}$$

The two above equations are equilibrium conditions. We assume that the price mechanism works so that markets always are cleared and trade is always balanced. Therefore, exports of Country I always equal imports of Country II, and vice versa.

(5) $$Y_2 = C_{2x} + P(1 + t_2)C_{2m}$$

We have assumed that Say's law holds so that everything that is produced is consumed and there is no saving. Then the above identity holds, specifying that the sum of consumption of the two goods in Country II equals its national income.

(6) $$S_{1m} = S_{1m}(S_{1x})$$

(7) $$S_{2x} = S_{2x}(S_{2m})$$

With fixed factor endowments, and assuming full employment, the production possibility frontiers given by the two equations above are the constraints on production.

(8)[1a] $$P = -(1 + t_1)\frac{\partial S_{1m}}{\partial S_{1x}}$$

(9) $$P(1 + t_2) = -\frac{\partial S_{2x}}{\partial S_{2m}}$$

We assume that competitive conditions hold for both economies.

[1a] The reader might observe that there is implicitly a functional relationship between $S_{1x}$ and $P$ (and analogously for $S_{2m}$). $S_{1x}$ can be written as a function of $P$ and $t_1$. Cf. Södersten [14, p. 32].

Then two behavior equations like the ones above can be set out, showing that in equilibrium the relative commodity price ratio (with tariffs included) must equal the marginal rate of substitution.

$$(10) \qquad C_{1m} = C_{1m}\left(\frac{Y_1}{1+t_1}, \frac{P}{1+t_1}\right)$$

$$(11) \qquad C_{2x} = C_{2x}(Y_2, P(1+t_2))$$

We have finally two demand equations that say that demand for any of the goods in the respective country is a function of its national income and of relative prices.

We have now set out a simple, but complete, general equilibrium model in eleven unknowns. Four of the eleven endogenous variables refer to consumption of the two goods in the two countries, four to production, two to national incomes, and one to relative prices. There are two exogenous variables, $t_1$ and $t_2$. We now assume that this set of equations has solutions for $t_1$ and $t_2$, and we are interested in studying the effects of tariff changes on our endogenous variables. For this purpose we take differentials of equations 1–11. By so doing and by rearranging some terms, the following system of equations can be set out:

$(1a) \quad dS_{1m} + PdS_{1x} + t_1 dC_{1m} = dY_1 - S_{1x}dP - C_{1m}dt_1$

$(2a) \quad dS_{2x} + PdS_{2m} + Pt_2 dC_{2m} = dY_2 - (S_{2m} + t_2 C_{2m})dP - PC_{2m}dt_2$

$(3a) \quad dC_{2m} + dC_{1x} - dS_{1x} - dS_{2m} = 0$

$(4a) \quad dC_{1m} + dC_{2x} - dS_{1m} - dS_{2x} = 0$

$(5a) \quad dC_{2x} + P(1+t_2)dC_{2m} = dY_2 - (1+t_2)C_{2m}dP - PC_{2m}dt_2$

$(6a) \quad (1+t_1)dS_{1m} + PdS_{1x} = 0$

$(7a) \quad dS_{2x} + P(1+t_2)dS_{2m} = 0$

$$(8a) \quad (1+t_1)^2 dS_{1x} = (1+t_1)\frac{\partial S_{1x}}{\partial P}dP - P\frac{\partial S_{1x}}{\partial P}dt_1$$

$$(9a) \quad dS_{2m} = (1+t_2)\frac{\partial S_{2m}}{\partial P}dP + P\frac{\partial S_{2m}}{\partial P}dt_2$$

$$(10a) \quad (1+t_1)^2 dC_{1m} = (1+t_1)\frac{\partial C_{1m}}{\partial Y_1}dY_1 + (1+t_1)\frac{\partial C_{1m}}{\partial P}dP$$

$$- \left(\frac{\partial C_{1m}}{\partial Y_1}Y_1 + \frac{\partial C_{1m}}{\partial P}P\right)dt_1$$

$$(11a) \quad dC_{2x} = \frac{\partial C_{2x}}{\partial Y_2}dY_2 + \frac{\partial C_{2x}}{\partial P}(1+t_2)dP + P\frac{\partial C_{2x}}{\partial P}dt_2$$

The next step is to give an explicit solution of this system that will show the effects of tariff changes on all the dependent variables.

It is important to be careful when solving the system. One of the main points of this type of analysis is to reach qualitative results and to be able to demonstrate the interrelationships among all the variables involved. If one is not careful, it is easy to end up with results that involve extremely cumbersome expressions that are difficult to interpret in an economically meaningful way.

The most convenient way of solving the model that we have found is the following. We start by rewriting the first three equations of the derived form of the model, 1a, 2a, and 3a, so that they contain only $dY_1$, $dY_2$, and $dP$ as unknowns. That gives:

$$(1a')\quad dY_1 = \frac{1}{1 + t_1\left(1 - \dfrac{\partial C_{1m}}{\partial Y_1}\right)}\left\{\left[\frac{Pt_1}{1 + t_1}\frac{\partial S_{1x}}{\partial P}\right.\right.$$

$$+ t_1\frac{\partial C_{1m}}{\partial P} + (1 + t_1)S_{1x}\bigg]dP + \bigg[(1 + t_1)C_{1m} -$$

$$\frac{t_1}{1 + t_1}\left(\frac{P^2}{1 + t_1}\frac{\partial S_{1x}}{\partial P} + \frac{\partial C_{1m}}{\partial Y_1}Y_1 + \frac{\partial C_{1m}}{\partial P}P\right)\bigg]dt_1\bigg\}$$

$$(2a')\quad dY_2 = \frac{1 + t_2}{1 + t_2\dfrac{\partial C_{2x}}{\partial Y_2}}\left\{\left[-P(1 + t_2)t_2\frac{\partial S_{2m}}{\partial P} - t_2\frac{\partial C_{2x}}{\partial P} + S_{2m}\right]dP\right.$$

$$+ \left[-P^2 t_2\frac{\partial S_{2m}}{\partial P} + \left(P - \frac{Pt_2}{1 + t_2}\right)C_{2m} - \frac{Pt_2}{1 + t_2}\frac{\partial C_{2x}}{\partial P}\right]dt_2\bigg\}$$

$$(3a')\quad \frac{1}{1 + t_1}\frac{\partial C_{1m}}{\partial Y_1}dY_1 + \frac{\partial C_{2x}}{\partial Y_2}dY_2 + \left[\frac{1}{1 + t_1}\frac{\partial C_{1m}}{\partial P}\right.$$

$$+ (1 + t_2)\frac{\partial C_{2x}}{\partial P} + \frac{P}{(1 + t_1)^2}\frac{\partial S_{1x}}{\partial P} + P(1 + t_2)^2\frac{\partial S_{2m}}{\partial P}\bigg]dP =$$

$$\left[\frac{1}{(1 + t_1)^2}\left(\frac{\partial C_{1m}}{\partial Y_1}Y_1 + \frac{\partial C_{1m}}{\partial P}P\right) + \frac{P^2}{(1 + t_1)^3}\frac{\partial S_{1x}}{\partial P}\right]dt_1$$

$$+ \left[-P\frac{\partial C_{2x}}{\partial P} - P^2(1 + t_2)\frac{\partial S_{2m}}{\partial P}\right]dt_2$$

The rest of the system, equations 4a to 11a, can also be expressed as linear combinations of $dY_1$, $dY_2$, $dP$, and the exogenous variables $dt_1$ and $dt_2$. We can therefore solve the above equation system of three equations in three unknowns and get explicit solutions for $dY_1$, $dY_2$,

and $dP$. After this has been done we can substitute these expressions for $dY_1$, $dY_2$, and $dP$ into the rest of the system and get explicit solutions for the other eight endogenous variables.

In order to simplify the solution of our equation system we rewrite it in the following manner:

(1a'') $$a_1 dX_1 - t_1 b_1 dP = - \frac{P t_1}{1 + t_1} \beta_1 dt_1$$

(2a'') $$a_2 dX_2 + t_2 b_2 dP = - P t_2 \beta_2 dt_2$$

(3a'') $$t_2 dX_1 - t_1 dX_2 = 0$$

where:

(12) $$a_1 = 1 + t_1 \left( 1 - \frac{\partial C_{1m}}{\partial Y_1} \right)$$

(13) $$a_2 = 1 + t_2 \frac{\partial C_{2x}}{\partial Y_2}$$

(14) $$dX_1 = dY_1 - S_{1x} dP - C_{1m} dt_1$$

(15) $$dX_2 = dY_2 - (1 + t_2) S_{2m} dP - P C_{2m} dt_2$$

(16) $$b_1 = \frac{P}{1 + t_1} \frac{\partial S_{1x}}{\partial P} + \frac{\partial C_{1m}}{\partial P} + S_{1x} \frac{\partial C_{1m}}{\partial Y_1}$$

(17) $$\beta_1 = \frac{P}{1 + t_1} \frac{\partial S_{1x}}{\partial P} + \frac{\partial C_{1m}}{\partial P} + C_{1x} \frac{\partial C_{1m}}{\partial Y_1}$$

(18) $$b_2 = (1 + t_2) \left[ P(1 + t_2) \frac{\partial S_{2m}}{\partial P} + \frac{\partial C_{2x}}{\partial P} + S_{2m} \frac{\partial C_{2x}}{\partial Y_2} \right]$$

(19) $$\beta_2 = (1 + t_2) \left[ P(1 + t_2) \frac{\partial S_{2m}}{\partial P} + \frac{\partial C_{2x}}{\partial P} + C_{2m} \frac{\partial C_{2x}}{\partial Y_2} \right]$$

When solving the equation system 1a''–3a'' we first take the inverse of its matrix:

(20) $$\frac{1}{\Delta} \begin{bmatrix} b_2 & \dfrac{t_1}{t_2} b_1 & \dfrac{a_2}{t_2} b_1 \\[2ex] \dfrac{t_2}{t_1} b_2 & b_1 & -\dfrac{a_1}{t_1} b_2 \\[2ex] -\dfrac{a_2}{t_1} & \dfrac{a_1}{t_2} & \dfrac{a_1 a_2}{t_1 t_2} \end{bmatrix}$$

where the determinant is $t_1 t_2 \Delta$ and where

(21) $$\Delta = a_1 b_2 + a_2 b_1$$

Solving for our unknown three variables gives:

(22) $$dX_1 = - \frac{Pt_1}{\Delta}\left(\frac{b_2\beta_1}{1+t_1}dt_1 + b_1\beta_2 dt_2\right)$$

(23) $$dX_2 = \frac{t_2}{t_1}dX_1$$

(24) $$dP = \frac{P}{\Delta}\left(\frac{a_1\beta_1}{1+t_1}dt_1 - a_1\beta_2 dt_2\right)$$

By substituting $dX_1$, $dX_2$, and $dP$ into our equation system we can get a complete solution to all the endogenous variables. We are therefore through with the mathematical manipulations and can go on to the economic analysis of our results.

## II. *The Terms of Trade, the Home Market Price Ratio, and Income Distribution*

We have already, in formula (24), established the results for the effects of a tariff on the terms of trade. The most striking fact about this result is that it is unambiguous: an increase in the tariff will always improve a country's terms of trade. The only exception, which we will soon come back to, is the case where the trading partner's supply or demand elasticities are infinitely large, in which case a tariff change will have no influence on the terms of trade.

We can also see that this result is symmetric in the sense that an increase in the second country's tariff will always turn the terms of trade against the first country, the only exception being the case where the first country's supply or demand elasticities are infinitely large, in which case the terms of trade will stay unchanged.

In order to look into the economic implications of expression (24) more closely, we will write it out in the following explicit way:

(25) $$\frac{dP}{P} = \frac{1}{\Delta}\left\{\frac{1}{1+t_1}\left(1 + t_2\frac{\partial C_{2x}}{\partial Y_2}\right)\left(\frac{P}{1+t_1}\frac{\partial S_{1x}}{\partial P} + \frac{\partial C_{1m}}{\partial P} + S_{1x}\frac{\partial C_{1m}}{\partial Y_1}\right)dt_1 \right.$$
$$- \left[1 + t_1\left(1 - \frac{\partial C_{1m}}{\partial Y_1}\right)\right](1 + t_2)\left[P(1 + t_2)\frac{\partial S_{2m}}{\partial P}\right.$$
$$\left.\left. + \frac{\partial C_{2x}}{\partial P} + C_{2m}\frac{\partial C_{2x}}{\partial Y_2}\right]dt_2\right\}$$

Formula (25) shows that the most important factor for the magnitude of change of the terms of trade is the flexibility of the two trading

economies, measured by the four partial derivatives $\partial S_{1x}/\partial P$, $\partial C_{1m}/\partial P$, $\partial C_{2m}/\partial P$, and $\partial C_{2x}/\partial P$.[1,2]

Let us assume that Country I increases its tariff. If the consumers or the producers in Country II are very sensitive to changes in the relative price structure, i.e., if $\partial S_{2m}/\partial P$ and $\partial C_{2x}/\partial P$ are large, they will make considerable adjustment of quantities consumed and produced, and the changes in the terms of trade needed to bring about the new equilibrium will be small. So the more flexible a country's economy is, the more successful it will be in neutralizing the effects of changes in her trading partner's tariff policy.

The flexibility of the economy of the country that raises its tariff is also important. In order to bring out this point we assume that the second country does not change its tariff, and we rewrite formula (24) in the following manner:

$$(27) \qquad \frac{dP}{dt_1} = \frac{P}{1+t_1}\frac{a_2\beta_1}{a_1b_2+a_2b_1} = \frac{P}{1+t_1}\frac{1}{\dfrac{a_1b_2}{a_2\beta_1}+\dfrac{b_1}{\beta_1}}$$

This shows that the larger the values of $\partial S_{1x}/\partial P$ and $\partial C_{1m}/\partial P$, the more will the terms of trade improve for the country imposing the higher tariff.

The next, and maybe more interesting, result concerns the home market price ratio. We can write the relative price of the export good in terms of the import good (tariffs included) in the following way: $P/1+t_1$. Differentiating this expression and solving gives:

$$(28) \qquad \frac{dP}{1+t_1} - \frac{Pdt_1}{(1+t_2)^2} = \frac{1}{\Delta}\left[\frac{P}{(1+t_1)^2}(a_2\beta_1 - \Delta)dt_1 - Pa_1\beta_2dt_2\right]$$

Again we get a new, neat result. Formula (28) shows that the relative price of the export good will always fall on the home market and that the imported good will become more expensive because of the tariff. This result does not coincide with established theory; why this is so we will shortly return to. Before we do so, it is appropriate to say a few words about its significance for income distribution.

The classic result about the effects of a tariff on income distribution

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[1] We have already somewhat loosely referred to these partial derivatives as supply and demand elasticities, as they measure exactly what demand and supply elasticities measure— that is, the sensitivity in the interrelationship between price and supply and demand. As our slightly lax, but convenient, use of language in this respect can hardly confuse anyone, we will continue to use it. Anyone who wants to can, of course, rewrite formula (25) in terms of elasticities. Cf. Södersten [14, pp. 36 et seq.].

[2] In the following discussion we assume that $\partial C_{1m}/\partial P$ and $\partial C_{2x}/\partial P$ are positive. This implies that $\Delta$ is positive. Cf. Södersten [14, pp. 37 et seq. and pp. 60 et seq.].

is contained in the so-called Stolper-Samuelson theorem [15]. It says that the real reward of the factor used intensively in the import-competing industry will increase because of the tariff and that the reward of the other factor will fall because of the tariff. This result has been attacked by Metzler, who claims that it holds only in certain instances, depending upon the effects of the tariff on the home market price ratio [11] [12].

Formula (28) shows that the Metzler case can never occur. Therefore, if one is willing to accept the main assumption of the Stolper-Samuelson analysis, that of linearly homogeneous production functions, the Stolper-Samuelson result holds without exception and a tariff will always hurt the factor used intensively in the export industry.

Before we go on with the analysis, however, it is appropriate to stop for a moment and scrutinize the standard results; for this purpose we use the two classic articles by Metzler published in 1949 [11] [12].

### III. *Some Peculiarities of the Metzler Analysis*

Metzler's two articles are rightly regarded as containing the standard results for the effects of tariffs on prices.[3] Lucid and clear as they are, they are, however, marred by some peculiarities and by what we regard as a major misconception in the formulation of the problem at hand. As none of the later writers in the field has improved upon the Metzler analysis in any essential aspect, we have chosen his papers as representing existing theory.

Stolper and Samuelson assumed that a tariff would always increase the price of the imported good. Having assumed this, they were able to show the effects of a tariff on the income distribution in a straightforward manner. Metzler, however, contended that one could not always be sure that a tariff would increase the price of the imported good. There could be a case where the improvement in the terms of trade was so large as to offset the tariff and that therefore the relative price of the imported good would fall because of the tariff. If this were to happen, the Stolper-Samuelson result would be reversed and the tariff would benefit the factor used intensively in the export industry.

In his first article, Metzler set out the condition that, if $\eta = 1-k$, the internal price ratio would be unaffected by the tariff. $\eta$ was defined as the second country's demand elasticity for the first (tariff-imposing) country's exports, and $1-k$ was defined as the first country's marginal propensity to consume its export good. Only if the trading partner's demand elasticity for the tariff-imposing country's exports were larger

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[3] For later contributions that, however, do not question Metzler's basic results, cf. Baldwin [1], and Bhagwati and Johnson [4]. For recent survey articles, covering the area, cf. Bhagwati [2] [3], and Chipman [6].

than the marginal propensity to consume exportables, would the price of the import good increase in the country levying a tariff; if its marginal propensity to consume its export good were larger than the foreign demand elasticity confronting its exports, imports would instead be cheaper because of the tariff.

The second paper aimed at correcting and elaborating this result from his first article. As that is the more interesting paper for our purpose, we will look at it more closely. In order to derive the effects of a tariff on the home market price ratio, Metzler set out the following model.

The demand function for the first country's imports he wrote as follows:

(a) $$u_1 = f_1[(1 + \tau)\pi]$$

where $\tau$ is the tariff rate and $\pi$ is the exchange rate (the price of Country II's currency in terms of Country I's currency).

In Country II the price of imports is $1/\pi$, and as there is no tariff in this country its demand function for imports is:

(b) $$u_2 = f_2(1/\pi)$$

The private expenditure of the residents of Country I for imports, measured in foreign currency, is $u_1$. But to this must be added what the government spends out of tariff income. The tariff income is equal to $\tau u_1$. Say a proportion $k$ of this income is spent on imports. Total expenditure on imports, in foreign currency, in Country I therefore amounts to:

(c) $$(1 + k\tau)f_1[(1 + \tau)\pi]$$

The total value of imports in Country II, in its currency, equals:

(d) $$(1/\pi)f_2(1/\pi)$$

Metzler further assumes that trade between the two countries shall balance and the markets be cleared. This leads to the following equilibrium condition:

(e) $$(1 + k\tau)f_1[(1 + \tau)\pi] = \frac{1}{\pi}f_2\left(\frac{1}{\pi}\right)$$

The internal price ratio in the first country is equal to $(1+\tau)\,\pi$. Differentiating this ratio with respect to $\tau$ using the equilibrium condition gives:[4]

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[4] The two elasticities $\eta_1$ and $\eta_2$ are defined $\eta_1 = -\pi(1+\tau)f_1'/f_1$ and $\eta_2(1/\pi)(f_2'/f_2)$. Metzler says that $\eta_1$ and $\eta_2$ "are ordinary elasticities of demand for imports in I and II respectively." This is not the case. They are total elasticities for changes in the offer curves with respect to price. Hence they also depend on supply factors.

(f) $$\frac{d(1 + \tau)\pi}{d\tau} = \frac{\pi}{\Delta}\left[\frac{k(1 + \tau)}{1 + k\tau} + \eta_2 - 1\right]$$

where $\Delta = \eta_1 + \eta_2 - 1$.

The only case in which the home market price ratio is not affected by a change in the tariff is when expression (f) is equal to zero. This happens when:

(g) $$\eta_2 = 1 - k\left(\frac{1 + \tau}{1 + k\tau}\right)$$

If $\eta_2$ is larger than the right-hand side of expression (g) the orthodox result will come about: an increase in the tariff will increase the price of the import good. Only if the opposite is the case will the relative price to importables fall because of the tariff. We might observe that the right-hand side of expression (g) can never be larger than one; if what Metzler terms the foreign demand elasticity for the first country's exports is larger than unity, the tariff-imposing country will always find that its imports become more expensive.

Metzler's analysis is of quite an implicit nature. Therefore we have to look more closely at the assumptions on which his analysis rests. First we might remark that he is not treating the general case, insofar as he starts from a situation with free trade and treats only the case with a tariff in one country and no tariff in the other country. Furthermore, $f_1$ and $f_2$, as we have mentioned, are not pure demand functions, but analytic expressions for the offer curves; this implies that the elasticities connected with them, $\eta_1$ and $\eta_2$, are not pure demand elasticities but also depend on supply factors.

A more peculiar, and as it seems, indefensible assumption is that he assumes the government to spend a certain amount, $k$, of the tariff income on imports irrespective of what prices are. This is connected with the fact that Metzler, like all other writers about tariffs, confuses two problems, that he treats two distinct problems as if they were one and the same: He tries at one and the same time to deal with the effects of a tariff and with a redistribution problem connected with the spending of the tariff income.[5]

There is, however, no reason to treat the two problems at the same time. The better approach to take if one wants to study the effects of tariffs is to isolate these effects. What we have done is to take two

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[5] The notion that the effects of tariffs on prices depend on the way the tariff proceeds are spent goes back at least to Marshall [10]. It was also adopted by Lerner in his well-known paper [9] which is the starting point for the modern analysis of tariffs and trade. It also seems that it was the use of geometry as a tool of analysis that forced this mode of thought upon Lerner. This is, however, an example of a problem that hardly can be dealt with in a satisfactory way using geometric methods.

demand functions and let all income (including the tariff income) be spent according to these functions so that demand for the two goods is a function of national income and of relative prices. It should not be astonishing that, if one introduces a second problem and assumes that a specific income, the tariff income, gives rise to a specific expenditure pattern, the problem becomes more complicated. But it seems quite unnatural that one should insist that the effects of a tariff or a tax on the price structure should hinge upon some specific way in which the tariff or tax is spent, instead of simply assuming that the income generated by the tariff or tax is spent according to the same general principle as all other income.

The main result of our investigation with regard to prices is, therefore, that simpler and less ambiguous results can be reached under more general assumptions once one realizes the nature of the problem and does not introduce a redistribution problem into the question of how tariffs affect relative prices.

## IV. *The Optimum Tariff*

Before we conclude this paper we should also deal with the important question of how tariffs affect the real incomes in the trading countries. This problem has to a certain extent been obscured by the fact that great stress has been laid upon its being a problem in welfare economics, a tradition inaugurated by Scitovsky [13]. We will not dwell upon its welfare aspects, as all that can be said from this point of view seems to be of a trivial nature. We simply define the optimum tariff as the tariff that maximizes a country's real national income.

The optimum tariff formula as it is stated in the literature is of the form $t = E\text{-}1$, where $t$ is the optimum tariff and $E$ is the elasticity of the foreign reciprocal demand for exports.[6] What has to be observed, however, is that this is the formula for the optimum tariff only in a very specific sense. It is a formula that holds for any tariff, not only the optimal one.[7] But being a tautology, it also holds for the optimum tariff. It is almost entirely devoid of content.

We will now go on and in a straightforward way derive a formula for the optimum tariff that is more meaningful than the one so often referred to in the literature.

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[6] This might be termed the basic formula. Others can be derived from it. For a derivation and discussion of it, cf. Bickerdicke [5], Graaff [7], and Johnson [8].

[7] One might add that the optimum tariff presupposes that the marginal rates of substitution in consumption and production at home are made equal to the marginal rate of transformation through foreign trade. This means, in geometric terms, that at the point where the optimum tariff formula holds, the community indifference curve of the tariff-imposing country should be tangent to the other country's offer curve. If this side-condition always is kept in mind, the formula becomes somewhat more meaningful.

The national income in Country I we defined as:

(1)          $Y_1 = S_{1m} + PS_{1x} + t_1C_{1m} = (1 + t_1)C_{1m} + PC_{1x}$

The change in the real income, using Laspeyre's index, we define as:

(29)          $dRI_1 = (1 + t_1)dC_{1m} + PdC_{1x}$

The change in the national income is:

(30)          $dY_1 = (1 + t_1)dC_{1m} + C_{1m}dt_1 + PdC_{1x} + C_{1x}dP$

Using (14) we get the change in real income as:

(31)          $dRI_1 = dX_1 + (S_{1x} - C_{1x})dP$

Using (22) and (24) we can express the change in the real income in the following explicit form:

(32)     $dRI_1 = \dfrac{P}{\Delta} \left\{ [a_2(S_{1x} - C_{1x}) - t_1b_2] \dfrac{\beta_1}{1 + t_1} dt_1 \right.$

$$\left. - [a_1(S_{1x} - C_{1x}) + t_1b_1]\beta_2 dt_2 \right\}$$

where $\Delta = a_1b_2 + a_2b_1$.

At first we might remark that the effects on the first country's real income from an increase of the tariff in the second country is unambiguous: An increase in its tariff will always hurt the first country unless the first country is completely flexible so that either its demand or its supply elasticities tend to infinity, in which case neither its terms of trade nor its real income will be adversely affected by increases of its trading partner's tariff.

The effect of Country I's own tariff changes on its real income is more ambiguous. Here it may go either way; the real income might go up or it might fall because of an increase in the tariff. We are interested in finding the optimum tariff, i.e., the tariff that maximizes a country's real income. The real income of Country I has a maximum when expression (32) is equal to zero. Hence the optimum tariff, $t_1^{opt}$, is:

(33)          $t_1^{opt} = \dfrac{a_2(S_{1x} - C_{1x})}{b_2}$

Or if we write it in a more explicit way:

(34)          $t_1^{opt} = \dfrac{\left(1 + t_2 \dfrac{\partial C_{2x}}{\partial Y_2}\right)(S_{1x} - C_{1x})}{(1 + t_2)\left[P(1 + t_2) \dfrac{\partial S_{2m}}{\partial P} + \dfrac{\partial C_{2x}}{\partial P} + S_{2m} \dfrac{\partial C_{2x}}{\partial Y_2}\right]}$

Formulae (33) and (34) give, in a somewhat implicit form, the optimum tariff for Country I. We might first observe that a large export share gives scope for a high optimum tariff. Otherwise the important factors stem from the second country. Again, we can see that the adaptability of the second country is of critical importance.[8] The marginal propensity to consume exportables in Country II is of a certain importance, but as it appears in both the numerator and the denominator its role is ambiguous. However, the supply elasticity of importables and the demand elasticity for exportables—the measures of adaptability of the economy, in other words—play an unambiguous role. The larger they are, the lower should Country I set its optimum tariff.

The economic significance of this result is easy to see. High values of these elasticities mean that the producers and consumers can easily adapt to changing circumstances. The producers can easily switch their factors of production from the export to the import competing line of production, and for the consumers the two goods are good substitutes. If both or any one of these conditions prevail, it does not pay for the country's trading partner to levy a high tariff on its imports. In the limiting case, where the values of the elasticities in question tend to infinity, the optimal policy for Country I will be free trade, as it will not be able to turn the terms of trade in its favor by a tariff but will only be limiting its trade at unchanged prices by levying a tariff on imports.

We will stop here. We have tried to deal with some of the basic problems in the theory of trade policy by a more explicit type of analysis than has usually been used in this area of economic analysis. We hope that we have been able thereby to demonstrate that simpler and clearer results can be derived and that a more thorough understanding of the interrelationships between the variables involved can be had.

There are, however, important problems that we have not touched on. As examples we might mention the effects of a tariff on income distribution in the case where the production function is not homogeneous of the first degree, and the question of the optimum tariff under retaliation. These and other problems of trade policy each merit a more thorough analysis and therefore fall outside the scope of a single article. We hope that we will be able to return to them on some future occasion.

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# ECONOMICS OF PRODUCTION FROM NATURAL RESOURCES

*By* Vernon L. Smith*

## I. *Introduction*

This paper attempts to provide a unified theory of production from natural resources. A single model of an industry is used to describe a dynamic process of recovery from such technologically diverse resources as fish, timber, petroleum, and minerals. Recovery from each of these resources is seen as a special case of a general model, depending upon whether the resource is replenishable, and on whether production exhibits significant externalities. A model of centralized management, with particular reference to "common property" resources, such as fisheries, under stationary conditions, is also discussed and compared with competitive recovery in the stationary state.

The paper builds directly upon, and has been much influenced by, the basic contributions of Gordon [6] and Scott [11] [12].

## II. *Environmental Technology*

The economy of man consumes two fundamental kinds of naturally occurring resources: (1) Replenishable resources, such as fish, timber, bison, and the whooping crane, and (2) nonreplenishable resources, such as petroleum, natural gas, and the products of mines. The second category is often called ' exhaustible resources," which is something of a misnomer since both types of resources are capable of exhaustion. The American bison, once of value to the American economy, is such a case, as also were the native trout of Lake Michigan.[1] This particular dichotomy is important analytically in that the first category of resources is capable of regeneration, as man consumes a flow of the resource, while the second represents a fixed stock whose inventory can only be diminished over time.

For purposes of production analysis, one of the most important technological features of a replenishable commercial resource like a fish or

[1] The two cases are different, however. Neither was exhausted in the physical sense, but in the economic sense. The biotic potential of fish is so large that complete extinction may be very difficult. With the Lake Michigan trout it was invasion by another predator—the sea lamprey—that destroyed the trout harvest. The lamprey have since been brought under control, and with restocking, the lake may again become an important fishery resource if pollution does not win the battle.

timber species is its law of growth. The growth characteristics of a species may be studied in terms of the growth in the number of members, and in the size of individual members [1], or in the aggregate mass of the species [8]. This paper will take a crude macrobiological approach, and deal only with variables which measure the aggregate masses of species. Such an approach is analogous to the aggregate production function hypothesis employed by economists in macroeconomics and growth theory.

The mass growth of a species will depend upon certain internal biological characteristics of the species, and on its environment, i.e., the abundance of food nutrients, and the existence and efficiency of other species which have predator or symbiotic relationships to the given species. We can think of any species to be harvested by man as subject to a "technological" law of growth governed by the ecological characteristics of the biosystem in which it resides [8].

In the simplest model of the technology of a replenishable resource, we consider a single species population with mass $X$ in pounds, board feet, or other appropriate measure of quantity. The ecological balance between this species and its natural environment is postulated to give rise to a law of mass growth of the form

$$(2.1) \qquad \dot{X} \equiv \frac{dX}{dt} = f(X).$$

From the general ecological descriptions usually given for any species [8] as well as for fish [2, pp. 7–8] [4, p. 209] and timber [7] [9] resources, it is reasonable to assume that $f(X)$ has the inverted "U" properties shown in Figure 1, i.e., $f(\underline{X})=f(\overline{X})=0, f'(X^\circ)=0, f''(X)<0, 0\leq X\leq\overline{X}$, where $\underline{X}$ and $\overline{X}$ are the minimum and maximum self-sustaining populations, and $X^\circ$ is the population producing the largest sustainable yield or net rate of growth. The yield function $f(X)$ measures the net effect of the birth rate, the growth rate of individual members, and the death rate from natural causes, including predation from nonhuman sources. Populations smaller than $\underline{X}\leq0$, are assumed not to be viable.

The most frequently postulated form for the yield function is the quadratic, giving

$$(2.1') \qquad \dot{X} = a_0 + X(a_1 - a_{11}X),$$

whose solution, $X(t)$, is the familiar and ubiquitous logistic law of growth [8, pp. 64–76].

In the natural state a replenishable resource, whose law of growth is governed by (2.1), will normally be expected to grow until the stable equilibrium $X=\overline{X}$, $\dot{X}=0$ is reached. In such circumstances commercial
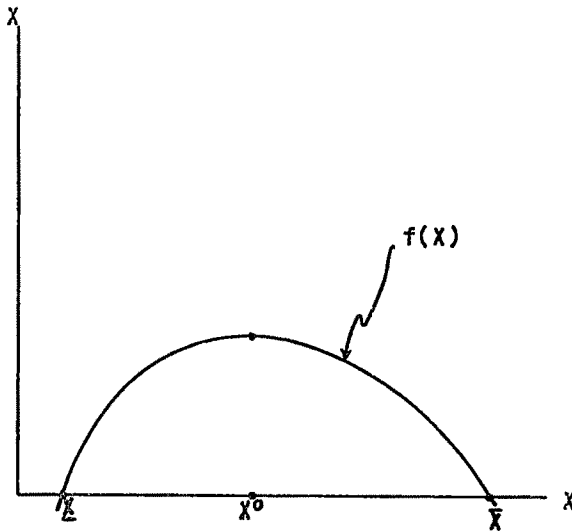
FIGURE 1

production from the resource by man will begin with these as initial conditions. (Note that $\underline{X}$ is unstable.)

With the entry of man as a predator in the form of an extractive industry—commercial fishing, forest products, and so on—equation (2.1) must be modified to serve as a technological restriction on the activities of the industry. Throughout this paper, in order to sharpen the essential features of the theory and simplify the arithmetic we will assume that recovery from a given resource is effected by $K$ homogeneous firms or units of capital, each producing an output rate, $x$. Total industry output is then $Kx$, where both $K$ and $x$ are, in general, variables. Hence, the required technological restriction might be written:[2]

$$(2.2) \qquad\qquad \dot{X} = f(X) - Kx.$$

It is understood that $x$, $K$, $X$ are each a function of time. Under our assumptions, $K$ is both the number of firms (e.g., fishing boats) in the

[2] More generally, we should write $\underline{\dot{X}} = f(X, Kx)$. In (2.2) we assume no interaction between the total harvest and the growth properties of the population mass, as likely will be the case if only restricted portions of the age distribution are harvested. Concerning my formulation of the constraint (2.2), and its use in the models to follow, the reader is urged to refer to [3], especially the mathematical appendix and the references cited there. Unfortunately, I suffered the impoverishment of not having acquired a copy of the important Crutchfield-Zellner book until after the present paper had been written. They work with the quadratic form of (2.2) in the context of a supply and demand industry model (and again in the treatment of the optimization problem of central management, both static and dynamic). Although my treatment was independent, and differs from theirs, the reader should view the present paper as essentially a generalization and explication of this earlier literature.

industry, and a measure of the real capital stock invested by the industry.

Turning now to nonreplenishable resources like petroleum, coal, iron ore, and other products of mines, we note that these form a simple special case of (2.2) in which $f(X) \equiv 0$, i.e., regeneration is assumed to be impossible so that the fixed stock declines at a time rate equal to aggregate industry output.

### III. *Cost Behavior—The Technology of Recovery*

The cost structure of the recovery process varies widely among the major commercial natural resources. Recovery cost in fishing, petroleum and natural gas is uniquely influenced by the "common property" character of these resources [6] [11]. No one has exclusively private rights in ocean fishing nor are such rights feasible to grant when commercial species are migrants. Similarly with crude oil extraction the reservoir's physical boundaries are often unknown, and even unknowable except at prohibitive cost. Such resources may therefore be shared by many private firms. An important consequence of this is that there may be direct and very significant external diseconomies in production, with an attending divergence of private and social optima.

On the other hand, forest and mineral resources are relatively divisible into independent productive units and to this extent are relatvelyi free of significant production externalities.[3] Thus, of the two replenishable resources, fisheries and forests, it is assumed that the former shows significant external diseconomies of production while the latter does not. With the two nonreplenishable resources, petroleum and mining, again, the former is assumed to exhibit significant diseconomies, the latter is not.

In industries such as mining and lumbering, the extractive total cost function for the individual firm is assumed to be of the form,

$$(3.1) \qquad C = \phi(x) + \hat{\pi}, \qquad C'(x) > 0, \qquad C''(x) < 0,$$

where $\phi(x)$ is total (fixed and variable) operating cost,[4] and $\hat{\pi}$ is the

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[3] The specialist will want to take this statement with a grain of salt. In forestry there are obvious externalities with regard to fire control (except remember that we are working with certainty models) and the spread of insects and disease. Also, in mining, one man's shaft may cause cave-ins or water encroachment on another mining property. A general disclaimer is in order: In a paper trying to emphasize the unity of production theory in the natural resource setting, one inevitably does a certain violence to the detailed facts, for there are indeed diverse elements to consider in the various cases of extraction. But the truth of unity, even if partial, is easily obscured by concentrating on more-or-less minor differentiating details.

[4] In (3.1) we somewhat oversimplify the view of mining and forestry production. In mining, cumulative output (or the unrecovered stock remaining) may affect cost; for this and other important considerations in mining see [13]. See footnote 11 for some relevant qualifications applying to appropriated forest resources.

normal profit or return on a unit of capital required to hold the unit (or firm) in the industry.

The most natural general hypothesis about total operating cost for the individual fisherman requires it to be an increasing function of the vessel's catch rate, $x$, but a decreasing function of fish population, i.e., $\phi = \phi(x, X)$, with $\phi_1 \equiv \partial\phi/\partial x > 0$, and $\phi_2 \equiv \partial\phi/\partial X < 0$. The latter specification is implied if it is the case that when there are more fish of a given species they are easier to catch. On the other hand if increases in $X$ cause no change in the density of stocks, as may be the case in some species, then it may be that $\phi_2 \equiv 0$. Externalities enter in an interesting and simple manner: *No individual competitive fisherman has control over population size as a private decision variable yet it enters as a parameter in each fisherman's cost function*. Externalities may also enter via crowding phenomena: If the fish population is highly concentrated, the efficiency of each boat may be lowered by congestion over the fishing grounds.[5] In general then the cost function may include $K$, and our most general cost hypothesis for the fishing firm is:

$$
\begin{aligned}
(3.2) \quad & C = \phi(x, X, K) + \hat{r}, \quad & C_1 \equiv \partial C/\partial x > 0, \\
& C_2 \equiv \partial C/\partial X \leq 0, \quad & C_3 \equiv \partial C/\partial K \geq 0.
\end{aligned}
$$

When $C_2 < 0$, recovery cost exhibits resource *stock externalities*. When $C_3 > 0$, recovery cost exhibits *crowding externalities*. Each case represents an external diseconomy to the industry. Equation (3.2) will serve as the most general cost function with which we shall be concerned. It includes (3.1) as a special case. Another special case is crude oil production, since oil well drilling, development and operating costs are essentially independent of crude production in primary recovery fields (fields subject to natural drive forces).

## IV. *A Model of the Competitive Recovery of Natural Resources*

We propose to characterize the competitive recovery process in any extractive industry by a system of three behavior equations describing the interactions of the resource, individual firms, and the industry. The term "industry" in the case of fishing and petroleum extraction will not necessarily refer to the entire industry, but to the collection of firms exploiting a given fishery or oil reservoir, since in these cases external interdependence is postulated.

[5] A good example is sport fishing for striped bass in San Francisco Bay. The stripers form schools to feed on schools of smaller food fish. The latter are driven to the surface, attempting to escape, and this attracts the gulls to feed. The fishing boats simply motor into the Bay looking for the mass of fighting gulls. The boats congregate around the gulls and then alternate with trolling passes through the concentrated school of stripers. On a busy holiday a considerable waiting line may develop.

The behavior equation for the resource has already been stated in (2.2), and describes the growth or decline of the stock as a function of stock size and industry output.

If we let $\rho\,(Kx)$ be the total revenue rate from the sale of $Kx$ units of the resource, then revenue per firm is $\rho(Kx)/K$, and, using (3.2) the most general form of the firm's pure or excess profit function is

$$(4.1) \qquad\qquad \pi = \frac{\rho(Kx)}{K} - C(x,\,X,\,K).$$

It is assumed that each firm perceives this profit to vary only with its own output and this only because its private cost is variable with output. Thus price, $\rho(Kx)/Kx$, is perceived as a given constant, and $C(x, X, K)$ is treated as a function only of the private control variable $x$. The behavior equation for firms is a perceived profit maximizing condition (price equals marginal cost), which serves to determine $x$ as a function of capital and resource stocks depending on revenue, cost and externality conditions, *viz*

$$(4.2) \qquad\qquad \frac{\rho(Kx)}{Kx} = \phi_1(x,\,X,\,K).$$

Some modification of the hypothesis (4.2) must be specified in the case of crude oil production where cost is substantially independent of output, and output depends primarily upon the characteristics of the field and its exploitation. In primary producing fields all crude oil is produced at the surface of a well by the action of one or more naturally occurring underground drives or pressures from edge water encroachment, a gas cap, or gas dissolved in the crude [10, pp. 391–93]. Both the rate of recovery and the cumulative recovery reduces the pressure level. So the output, $x$, of a given well can be regarded as a decreasing function of aggregate current output, $Kx$, and a decreasing function of cumulative output, $\overline{X}\text{-}X$, or[6]

$$(4.2a) \qquad x = g(Kx,\,X), \qquad \frac{\partial g}{\partial(Kx)} \equiv g_1 < 0, \qquad \frac{\partial g}{\partial X} = g_2 > 0.$$

Finally, new firms (capital) are assumed to be attracted into the industry when $\pi > 0$, while producing firms are driven out of the industry when $\pi < 0$. Specifically, it is supposed that this flow of capital is proportional to pure profit, or

---

[6] Alternatively we could write $x = h(K, X)$, $h_1 < 0$, $h_2 > 0$. With secondary (water or gas injection) and stripper (mechanical pumping) recovery fields, the cost function will be as in (3.2). We assume in the text that the ultimate cumulative recovery, $\overline{X} - \underline{X}$ is known and is independent of the production path. In fact, the total free-flow recovery may depend upon the extraction rate. See, for example, [5, pp. 91–92], and the references cited there.

(4.3)
$$\dot{K} = \delta\left[\frac{\rho(Kx)}{K} - C(x, X, K)\right],$$

where $\delta > 0$ is a behavioral constant for the industry.[7]

In summary, our behavioral equation system is

(I.1)
$$\dot{X} = f(X) - Kx,$$

(I.2)
$$\frac{\rho(Kx)}{Kx} = C_1(x, X, K), \quad \text{or} \quad x = g(Kx, X), \quad \text{for crude oil,}$$

(I.3)
$$\dot{K} = \delta\left[\frac{\rho(Kx)}{K} - C(x, X, K)\right],$$

with $f(X) \equiv 0$ for oil, gas and mineral stocks, and $C_2 \equiv C_3 \equiv 0$, for mineral and timber resources.[8] It is further assumed that equation (I.2), whatever its particular form, always provides a unique $x$ for every $(X, K)$ pair (i.e., a mapping $X, K \to x$). Then the system I provides two first-order differential equations in $X$ and $K$ of the form,

(II.1)
$$\dot{X} = F(X, K)$$

(II.2)
$$\dot{K} = I(X, K),$$

with initial conditions $X(0)$ and $K(0)$. Where recovery requires specialized capital, exploitation begins with $X(0) = \overline{X}$ and $K(0) = 0$, i.e., the resource is in static mass equilibrium with its environment, and an exploiting industry does not exist. If exploitation begins with a direct transfer of capital from other industries (e.g., haddock and cod fishing vessels shift to lobster), then $K(0) > 0$.

## V. *The Dynamics of Competitive Recovery*

### A. *General*

Equation system II together with the initial conditions describe the velocity of a point in the "phase space" $(X, K)$ i.e., the rates of increase

---

[7] In (4.3) we assume capital to be equally mobile out as well as into an industry, i.e., there is no problem of irreversibility. More generally we could write

$$\dot{K} = \begin{cases} \delta_1\pi, & \text{if } \pi \geq 0 \\ \delta_2\pi, & \text{if } \pi < 0. \end{cases}$$

We later assume $\delta_2 = 0$ in the case of oil wells, which clearly cannot be reduced in quantity once drilled.

[8] Many variations on the particular forms of these behavior equations could be made. In place of (I.3) some variant of the accelerator hypothesis or an adaptive expectations hypothesis about investment could be introduced. In (I.2) any output adjustment hypothesis might be used in place of the classical—price equals marginal cost. If fishing is concentrated in a single season of the year (such as spawning time), then a difference equation expression of growth-harvest behavior could substitute for (I.1).
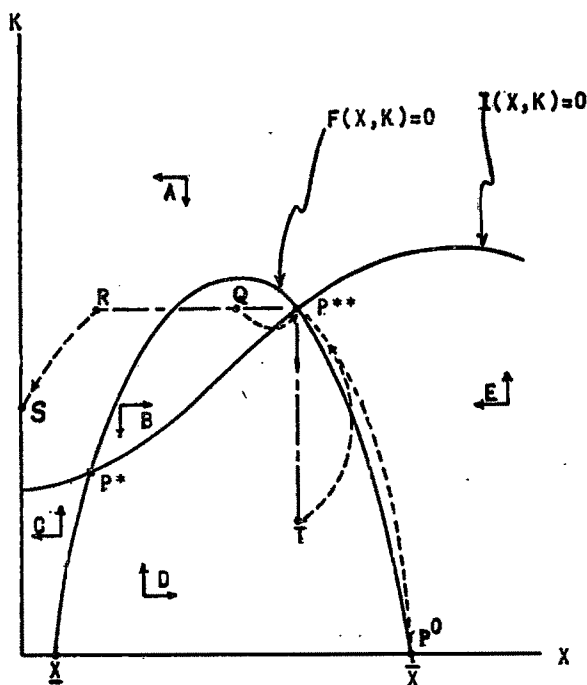
FIGURE 2

or decrease in (i) the resource stock, (ii) the level of capital investment of the industry.

A static equilibrium or singular point $(X^*, K^*)$ is defined by the property that $F(X^*, K^*) = 0$, $I(X^*, K^*) = 0$. There may be many such points. Two such singular points ($P^*$ and $P^{**}$) are illustrated in the phase diagram of Figure 2 for a replenishable resource. Points in the set defined by $F(X, K) = 0$ correspond to *equilibria between the resource mass and its environment*, while points in the set defined by $I(X, K) = 0$ correspond to *equilibria between the exploiting industry and alternative uses of capital in the economy* as a whole. Both equilibrium relations presuppose instantaneous output adjustment in accordance with firm profit maximization (I.2). In Figure 2 it is assumed that $\partial F/\partial K < 0$; for any given resource stock, an increase (decrease) in the size of the industry will decrease (increase) the rate of growth of the resource, i.e., production exceeds the rate of replenishment. Also it is assumed that $\partial I/\partial K < 0$; for any given resource stock, an increase (decrease) in the size of the industry lowers (raises) profit and reduces (increases) the flow of capital into the industry. Conditions for the validity of these two assumptions are stated in the appendix. The assumptions apply only to the illustration in Figure 2, and not to the model in general.

Under these assumptions the nonnegative quadrant is partitioned into five regions by the $F$ and $I$ curves. In region A, above both curves, both the industry and the resource stock will decline. In region D, below both curves, both the industry and the resource stock will grow. In regions B, C and E the remaining combinations of growth in $K$ and $X$ occur as shown. The perpendicular arrows in each region indicate in the usual way, the directions of motion along a development path in phase space. If initially the resource population is at $\overline{X}$, and $K = 0$, then (by hypothesis) $\dot{K} > 0$ and capital flows into the new extractive industry reducing the resource mass along the path from $P^0$ to $P^{**}$ as shown. $P^{**}$ is an equilibrium point for the conditions postulated in the illustration. At $P^{**}$ the industry is in equilibrium with the economy, and the species mass is in ecological equilibrium (total recruitment of new mass equals the harvest rate). The illustration shows $P^{**}$ to be locally, but not globally stable. Thus, suppose having reached $P^{**}$, there is a sudden reduction in $X$ from natural causes—such as a disease which wipes out the susceptible portion of the species and then disappears. The system is then shifted to the point $Q$ or $R$. At $Q$ firms suffer losses, and capital starts to leave the industry, while the natural productivity of the resource is increased to a level above harvesting by the industry. The resource mass rises, and the industry declines until the state of the system crosses into region D where the industry is once more profitable. Capital now flows back into the industry, and the resource mass continues to grow until balanced by the industry harvest at $P^{**}$. If the catastrophe is large, and the system shifts to a point such as $R$ in region A, the resource mass declines, and the yield of the species is lowered. As a result the harvest exceeds the yield, the resource stock falls, and the industry declines until both may be put out of business at $S$.

The qualitative properties of virtually any conceivable pattern of resource exploitation can be depicted by a phase diagram similar to the illustration of Figure 2. Invasion of the resource domain by a new parasite or predator, which becomes a permanent aspect of the environment, can be represented by a downward shift of the $F$ function. $F$ may fall below $I$ so that the invading parasite or predator together with the industrial harvest wipes out the resource and thence the industry. Such was the course of events when the lamprey invaded Lake Michigan destroying both the lake trout and the lake's fishing industry.

From the above illustration it is clear that commercial production from a replenishable resource need not in time destroy the resource. Exploitation by man *may* disrupt a delicate balance which destroys a resource. But the existence of external diseconomies (though it lead to non-Pareto efficient production states) does provide a built-in mechanism tending to resist annihilation of the resource: harvesting depletes

the stock, costs rise and, *ceteris paribus*, discourages harvesting, with the possibility if not a guarantee of an equilibrium such as $P^{**}$ in Figure 2.

We turn next to an analysis of various special applications and examples of the general model.

## B. Selling Price Constant: The Fishery

Much of the more systematic literature on resource economics has been concerned with the implications of competitive recovery under conditions of constant price, not only to the individual firm, but also to the individual resource deposit, fishing ground, and so on [2] [6]. It is therefore of some interest to explore the implications of the model for this case.

With selling price, $p \equiv \rho(Kx)/Kx \equiv$ constant, system I becomes,

(IA.1)                     $\dot{X} = f(X) - Kx$

(IA.2)                     $p = C_1(x, X, K)$

(IA.3)                     $\dot{K} = \delta[px - C(x, X, K)].$

Writing total differentials of equations (IA.2) and (IA.3), and solving for $dK/dX$, we get

(5.1)                   $$\frac{dK}{dX}\bigg|_{\dot{K}=0} = \frac{-C_2}{C_3},$$

which is the slope of the $I(X, K) = 0$ function in system II. Hence, if $C_2 < 0$, $C_3 > 0$, i.e., we have external diseconomies from both fish shortage and crowding by vessels, then $I(X, K) = 0$ defines $K$ as an increasing function of $X$. Every reduction in the fish mass will increase costs, and force some fishermen out of the industry until a new normal-return equilibrium is established.

In like manner, differentiating (IA.1) and (IA.2), with $\dot{X} = 0$, we get

(5.2)                   $$\frac{dK}{dX}\bigg|_{\dot{X}=0} = \frac{KC_{12} + C_{11}f'}{xC_{11} - KC_{13}}$$

for the slope of $F(X, K) = 0$. Since $f' \lessgtr 0$, if $C_{12} < 0$, $C_{11} > 0$, $C_{13} > 0$, the sign of this derivative is not determined on the basis of qualitative considerations alone, and may change in the phase space.

Figures 3–5 illustrate some possible effects of different externality assumptions on industry equilibrium, $I(X, K) = 0$, and several possible solution paths in phase space. In each case it is assumed that

$$\frac{dK}{dX}\bigg|_{\dot{X}=0}$$

is positive below some value of $X$, and negative above that value.

$G_2 \equiv C_{12} \equiv 0$
$C_3 > 0, C_{13} > 0, C_{11} > 0$

$F(X,K)=0$

$I(X,K)=0$

$K^*$

$P^*$

$X$

$\underline{X}$          $\overline{X}$

FIGURE 3a



$C_2 \equiv C_{12} \equiv 0$
$C_3 > 0, C_{13} > 0, C_{11} > 0$

$K^*$  $P^*$

$I(X,K)=0$

$F(X,K)=0$

$X$

$\underline{X}$          $\overline{X}$

FIGURE 3b

$$C_3 \equiv C_{13} \equiv 0$$
$$C_2 < 0, C_{12} < 0, C_{11} > 0$$

$I(X,K)=0.$

$(III)$

$F(X,K)=0$

$(II)$

$(i)$

A

B

P*

K

X*

$\underline{X}$

$\overline{X}$

X
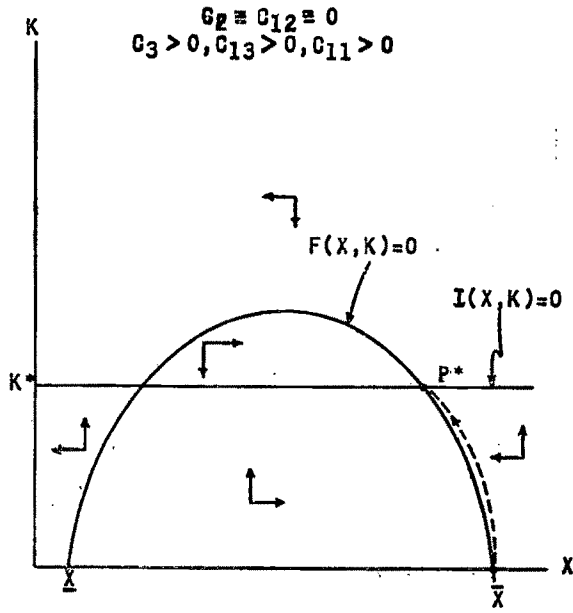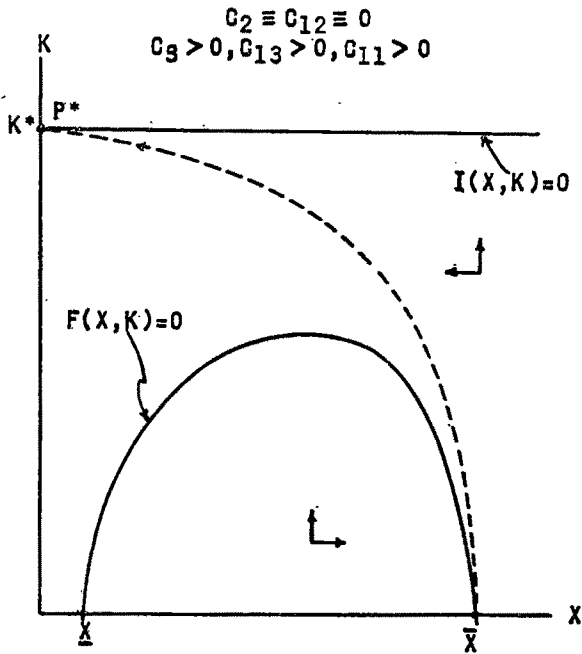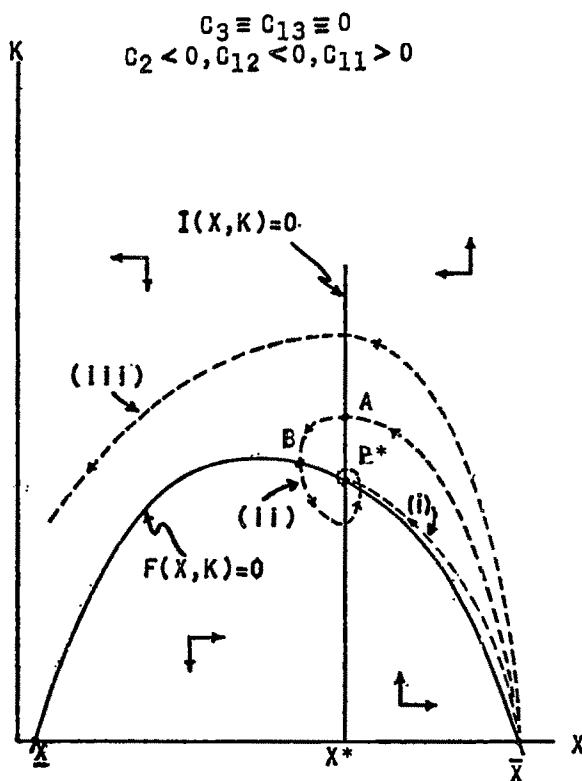
Figure 4a

In Figures 3a and 3b, with no resource stock externalities, but with crowding externalities, industry equilibrium occurs at $K^*$ independent of $X$. A possible path to the equilibrium at $P^*$ is shown. In Figure 3b the resource is so profitable that it is wiped out before crowding externalities limit the industry's growth.

In Figures 4a–c, we assume stock externalities to be significant but no crowding externalities. In contrast to the previous case, industry equilibrium is determined at $X^*$ independent of $K$. Figure 4a shows three possible paths to equilibrium: (i) a direct path to $P^*$ with monotone growth in the industry and monotone decline in the resource stock to the self-sustaining level $X^*$; (ii) a cyclical path in which firms respond so quickly to pure profits that when industry equilibrium is reached at $A$ the harvest exceeds the yield of the stock causing the stock to continue falling. But with the stock continuing to fall costs rise, losses are incurred, and firms are forced out of the industry. The declining harvest eventually provides equilibrium of the resource stock, at $B$ but the industry is declining. And so on in a convergent cyclical path

$$c_3 \equiv c_{13} \equiv 0$$
$$c_2 < 0, c_{12} < 0, c_{11} > 0$$

$I(X,K)=0$

$F(X,K)=0$

FIGURE 4b

$$c_3 \equiv c_{13} \equiv 0$$
$$c_2 < 0, c_{12} < 0, c_{11} > 0$$

$I(X,K)=0$

$F(X,K)=0$

$P^*$

FIGURE 4c

$C_2 < 0, C_3 > 0$
$C_{11} > 0, C_{12} < 0, C_{13} > 0$

$I(X,K)=0$

$F(X,K)=0$

$P^*$

$\underline{X}$   $\bar{X}$

FIGURE 5a



$C_2 < 0, C_3 > 0$
$C_{11} > 0, C_{12} < 0, C_{13} > 0$

$I(X,K)=0$

$F(X,K)=0$

$\underline{X}$   $\bar{X}$
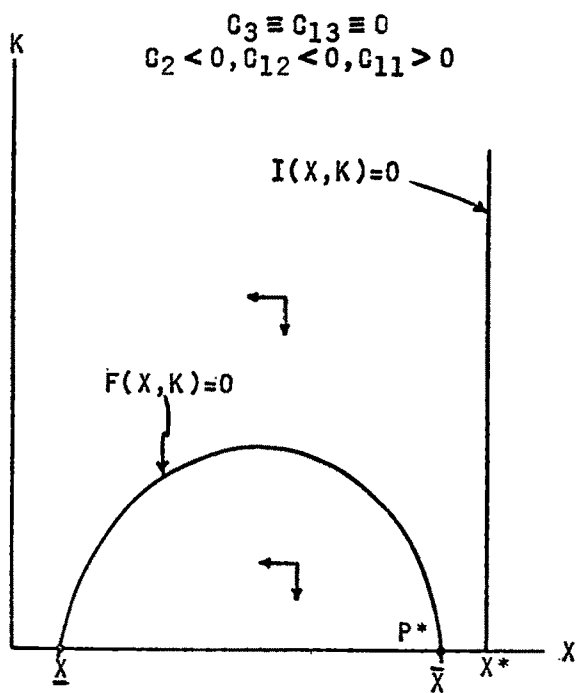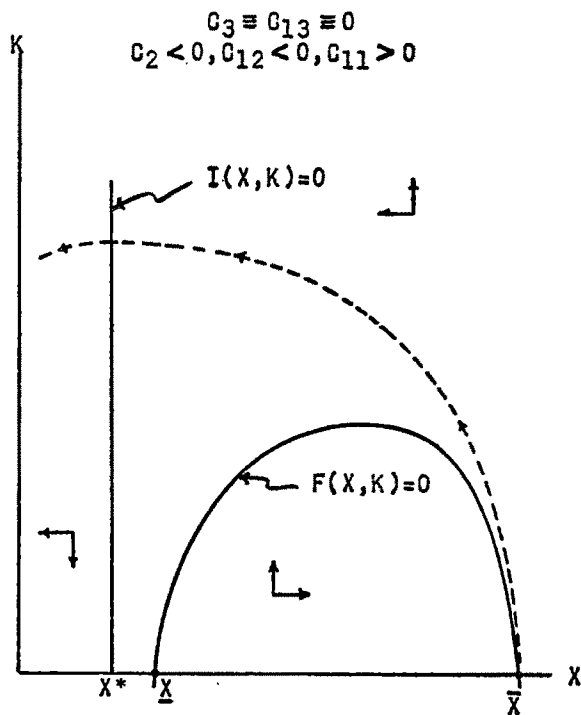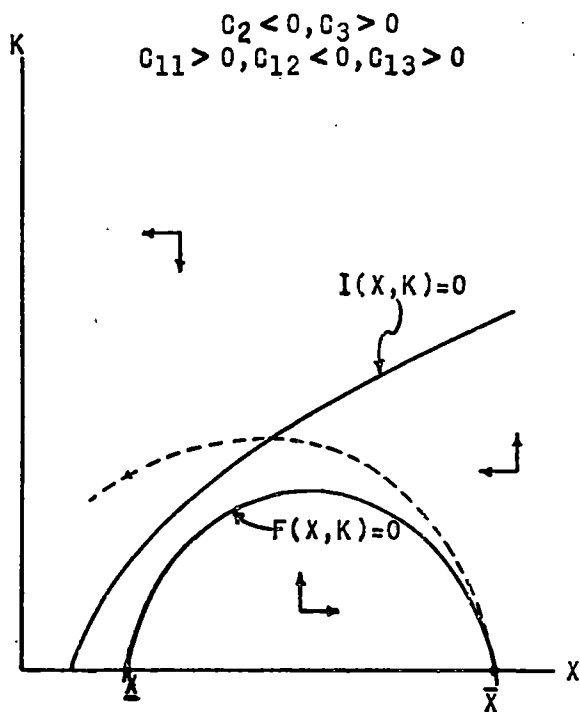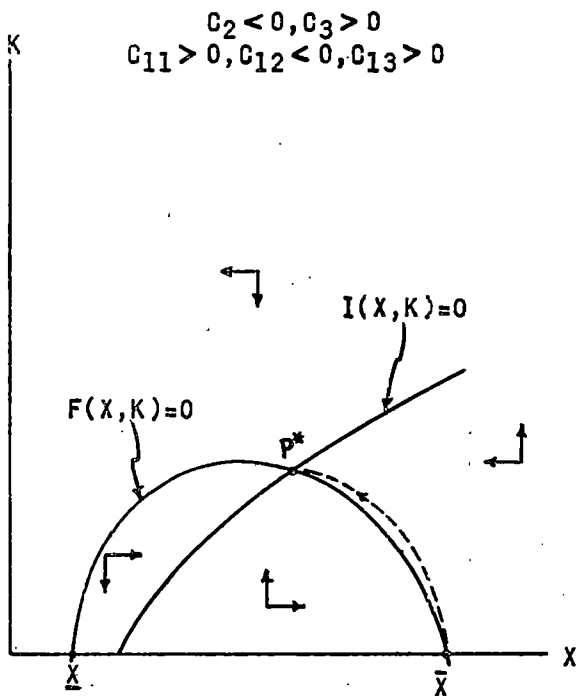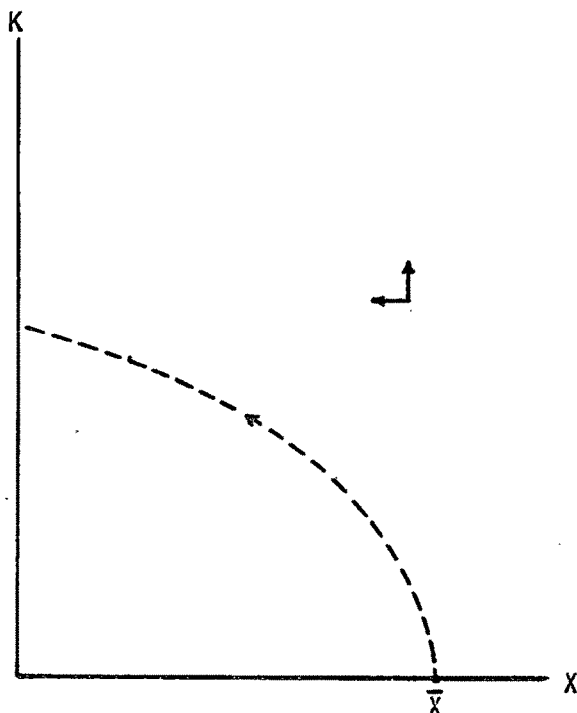
FIGURE 5b

with capital flowing in and out in response to cost changes induced by the decline and rise of the stock level; (iii) a path in which the entry speed of new firms is so rapid, and resource stock externalities such, that the stock is depleted before capital outflow due to losses can bring the harvest rate below the yield. Figure 4b illustrates the polar case in which the harvest is so profitable that the resource is sure to be depleted, while 4c shows the opposite pole where it does not pay to harvest any of the resource. Figures 5a and 5b illustrate the more general case in which both kinds of externalities are present.

## C. *Mining*

We have assumed mining to be the prototype of a nonreplenishable resource with insignificant externalities due to resource scarcity and crowding. Under these assumptions $f(X) \equiv 0$, and $C_2 \equiv C_3 \equiv 0$ in system (IA). Hence, if recovery is profitable, $x = x^0$ is determined by equation (IA.2), and $\dot{K} = \delta[px^0 - C(x^0)] > 0$. Capital flows into the resource at a constant rate, and the depletion rate of the resource is $\dot{X} = -Kx^0$. Figure 6 illustrates the equilibrium path to depletion.
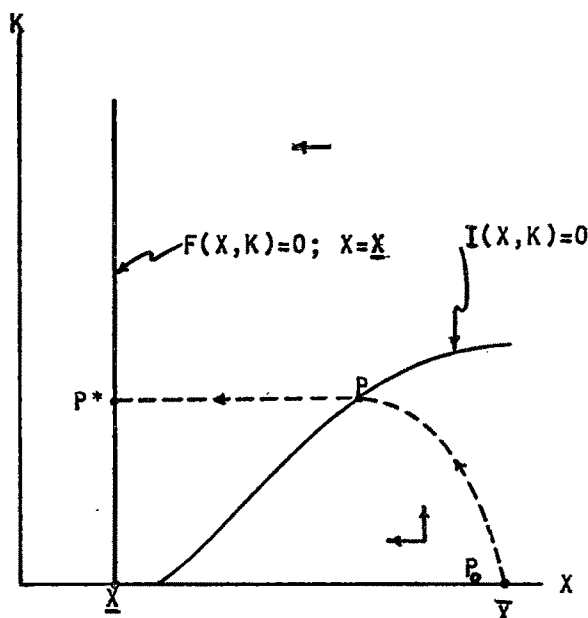
**FIGURE 7**

## D. *Petroleum*

The dynamics of competitive petroleum recovery is slightly more complicated due to externalities. The fixed price equation system is:

(IB.1)   $X = -Kx$

(IB.2)   $x = g(Kx, X)$,    $g_1 < 0$,    $g_2 > 0$.

(IB.3)   $\dot{K} = \delta[px - C_0]$,   $\delta = 0$,   if $px < C_0$,   $\delta > 0$ otherwise.

In equation (IB.3) we impose the condition that $\dot{K} \geq 0$; wells once drilled cannot "flow out" of the resource. With all costs fixed, production continues as long as the natural drive forces persist.

Observe first that if it pays to drill any wells at all, then at some point $K > 0$, and, by (IB.3), $K$ can never fall. Hence, $\dot{X} = 0$ in (IB.1) if and only if $x = 0$, i.e., the resource is not in equilibrium until well output is zero. The resource equilibrium set, defined by $F(X, K) = 0$ in system II is here defined by the condition $g(0, \underline{X}) = 0$, where $X = \underline{X}$ is the depleted level of the oil reservoir (Figure 7). That is, the primary or free-flow stage of recovery ends at $X = \underline{X}$, when $x = 0$. Similarly, equilibrium in the industry, defined by the function $I(X, K) = 0$ in system II, is here defined by (IB.2) and (IB.3) with $\dot{K} = 0$, or $C_0/p = g(KC_0/p, X)$. Writing the total differential of this last equation and solving for

$dK/dX$, gives the slope of $I(X, K) = 0$:

$$(5.3) \qquad \frac{dK}{dX}\bigg|_{\dot{K}=0} = -\frac{pg_1}{C_0 g_2} > 0.$$

Hence, the equilibrium size of the industry is a strictly increasing function of the size of the untapped oil reservoir, $X$.

The phase diagram for the competitive exploitation of an oil reservoir will therefore appear as in Figure 7. Initially, the system is at $P_0(K = 0, X = \overline{X})$, where $\overline{X}$ is the initial level of the oil reservoir stock. Since $I(X, K) = 0$ is shown above $P_0$, it pays for drilling firms to exploit the resource. Hence $\dot{K} > 0$, $\dot{X} = -Kx < 0$, and the state of the system moves along some path to a point $P$ on $I(X, K) = 0$ as shown. Thereafter, $\dot{K} = 0$, but the stock decline, $\dot{X} = -Kx < 0$, proceeds apace until $x = 0$ at $P^*$. The reservoir is depleted, the wells capped and abandoned (unless pumping is profitable).

### E. *Timber*

Timber resources are replenishable, but we assume no significant production externalities either from population scarcity or crowding by producers. These assumptions may also apply to exhausted historical species like the whooping crane and the American bison (if both species were so easily harvested that cost was not influenced by population mass). System (IA) becomes:

$$(IC.1) \qquad \dot{X} = f(X) - Kx$$

$$(IC.2) \qquad p = C_1(x)$$

$$(C.3) \qquad \dot{K} = \delta[px - C(x)]$$

(IC.2) determines $x^0$. If $px^0 - C(x^0) > 0$ harvesting is profitable, and firms enter the resource. Eventually the entire stand, and all new growth during the exploitation period is exhausted, as illustrated in Figure 8. Such is the demise of an unappropriated replenishable resource which does not exhibit external diseconomies to the industry.

### VI. *Centralized Fishery Management: Sole Ownership and Regulated Competition*

In the literature of fishery economics the important papers by H. Gordon [6] and A. Scott [11] have emphasized the advantages of unified management or "sole ownership" of the fishing ground as distinct from the unregulated decentralized exploitation of the resource. Sole ownership permits the social costs of production to be borne privately with the result that the private producer has the incentive to manage the

$K$

$F(X,K)=0$

$\underline{X}$   $X$   $\bar{X}$
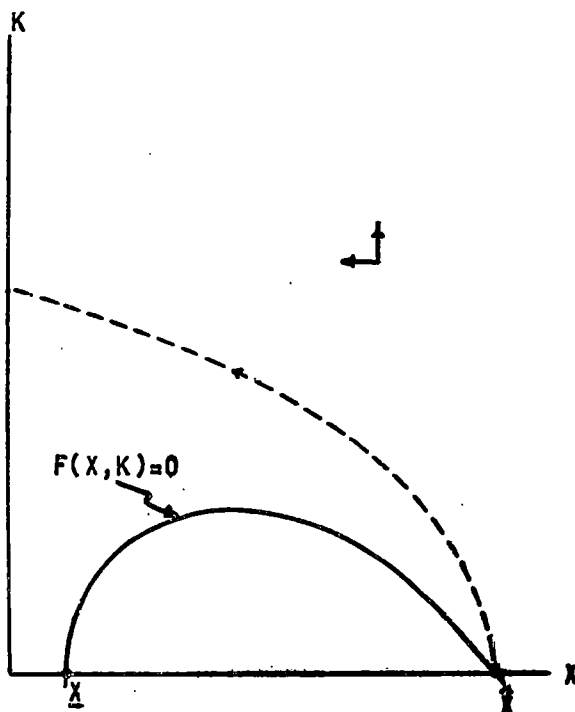
FIGURE 8

resource in the interests of society as well as his own. To see how these results follow using the competitive model of this paper, we must develop the contrasting model of centralized management.

We assume with Gordon and Scott that there are many fishing grounds so that centralizing the ownership (or right of access) of any one does not introduce monopoly elements.[9] We continue to assume steady-state equilibrium, $\dot{X}=0$. Under centralized management $x$, $X$ and $K$ will all be decision variables subject to control, in the interest of profit, by the sole owner. His profit function will be $\pi=pKx-KC(x, X, K)$ which is to be maximized with respect to $(x, X, K)$, subject to $\dot{X}=f(X)-Kx=0$. The Lagrangean is thus

$$\Psi = pKx - KC(x, X, K) + \lambda[f(X) - Kx],$$

and the first order conditions for an interior maximum can be written:

---

[9] This assumption is not essential, but keeps the arithmetic simpler. If sole ownership leads also to monopoly, we might still study the efficiency implication of the former uncontaminated by monopoly effects by imposing as an *additional constraint* upon the sole owner the price control condition $p(Kx) \leq Kx\bar{p}$, where $\bar{p}$ is the maximum selling price permitted.

$$\frac{\partial \Psi}{\partial x} = pK - KC_1 - \lambda K = 0$$

$$\frac{\partial \Psi}{\partial X} = - KC_2 + \lambda f'(X) = 0$$

$$\frac{\partial \Psi}{\partial K} = px - KC_3 - C - \lambda x = 0$$

An interior maximum must therefore satisfy the system

(6.1) $$f(X) = Kx$$

(6.2) $$p - C_1 = \lambda$$

(6.3) $$p - \frac{C}{x} - \frac{KC_3}{x} = \lambda$$

(6.4) $$\lambda = \frac{KC_2}{f'}$$

By way of interpreting these conditions, note that total fleet catch, $Kx$, can be increased either by increasing catch per vessel, $x$, or by expanding the fleet, $K$. The Lagrange multiplier $\lambda$, in this instance, is the marginal profitability of the total fleet catch (or yield of the fish mass). Condition (6.2) requires the marginal profitability of increasing catch by intensive use of the fleet (i.e., by increasing $x$) to be equal to the marginal profitability of total fleet catch, $\lambda$. Condition (6.3) requires the marginal profitability of the catch from fleet expansion to equal $\lambda$. Thus (6.2) and (6.3) state that profitability at the intensive and extensive capital margins must be equal. Finally, $KC_2/f'$ is the marginal external or social cost of the fleet catch. An increase in catch tending to lower the fish mass contributes fishing costs external to the individual boats. Since $C_2$ is negative while $f'$ may be negative or positive, the question arises as to whether a maximum can occur with negative marginal social cost. It is easy to prove that a global maximum cannot occur at an $X^*$ such that $f'(X^*) > 0$. Suppose we have equations (6.1)−(6.4) satisfied by a point $(x^*, X^*, K^*)$, with $f'(X^*) > 0$. Then we know from the properties of $f(X)$, that there is an $X^{**} > X^*$ such that $f'(X^{**}) < 0$, and $K^* x^* = f(X^*) = f(X^{**})$. But since $C_2 < 0$, $C(x^*, X^*, K^*) > C(x^*, X^{**}, K^*)$ It follows that the point $(x^*, X^{**}, K^*)$ satisfies the constraint, and yields a greater profit. Hence, $f' < 0$ and $KC_2/f' > 0$ in (6.4).[10]

Under competitive harvesting $KC_2/f'$ is a social cost which does not

[10] Imposing a global maximum criterion is essential here since a "solution" with $X = X^*$ may not only satisfy (6.1)–(6.4) but also the corresponding second-order conditions for a relative interior maximum.

affect firm behavior; but this cost is "privatized" when property rights are vested in a central manager-owner who adjusts his operations according to (6.2) and (6.4) to account for these social costs. Similarly will the central manager adjust for the effects of boat crowding over the fishing ground. Thus in (6.3), multiplying through by $x$, $px$ is the gross marginal revenue from an additional vessel, $C$ is the long-run direct internal cost, while $KC_3 + \lambda x$ is the long-run marginal external social cost of operating an additional vessel. An addition to the fleet produces external crowding cost at the rate $KC_3$, and external fish scarcity cost at the rate $\lambda x$.

For the sole owner when $C_2 \equiv C_3 \equiv 0$, we have the conditions which could be postulated to apply to *appropriated* timber resources. With the appropriation of forest property rights comes an incentive to "conserve," and the forest will not be wiped out as in our previous model. The first order conditions become:

$$f(X) = Kx$$
$$p - C_1 = \lambda$$
$$C_1 = \frac{C}{x}$$
$$f'(X) = 0$$

We see that only in the absence of resource stock externalities is it optimal to maintain the resource stock at the level which maximizes recruitment or sustainable yield, where $f'(X^0) = 0$.[11]

[11] This result could be misleading in that it conflicts with some of the forestry economics literature [7], which contains valid arguments against the objective of maximizing sustainable yield. I do not argue that forest managers "should" maximize sustainable yield. This is simply a result of the assumptions made above, and I do not have any commitment to the assumptions. In a model of maximization over time and/or in a model in which forest husbanding costs are introduced and assumed to depend upon forest stock, sustainable yield will no longer be maximized in an optimal program.

With maximization over time, the discounting process will associate interest cost with $X$ because forest growth depends upon $X$. Even in a static model, if husbanding costs depend upon $X$, we must then write cost as $C(x, X)$, not because of externalities measured by $X$, as in fishing, but because appropriation brings the incentive to incur costs of cultivating the stock. In such a case, the first order conditions for the sole forest owner are:

$$f(X) = Kx$$
$$p - C_1 = \lambda$$
$$C_1 = \frac{C}{x}$$
$$\lambda = \frac{KC_2}{f'}$$

However, in contrast with the fishing model, $C_2 > 0$ (husbanding costs increase with the stock). Consequently, for a global maximum, $f' > 0$, and the optimally managed stock is lower than the stock corresponding to maximum sustainable yield.

By comparing (6.1)–(6.4) with the system (IA.1)–(IA.3), where $\dot{K}=\dot{X}=0$ in the latter, we contrast sole ownership with decentralized competitive recovery in the stationary state. The two systems differ only in that the sole owner perceives a *unit catch* cost, $\lambda=KC_2/f'$, and an *annual boat* cost $KC_3+\lambda x$, which is not incurred by the decentralized competitive fisherman. Theoretically, then, the problem of regulating competitive recovery can be stated as one of imposing these unperceived social costs on the industry. The partial equilibrium solution to the regulation problem is to levy an extraction fee $\mathsf{U}=KC_2/f'$ per unit of catch unloaded at the wharf, plus an annual license fee $L=KC_3$ on each fishing vessel.[12] As a consequence profit after taxes to each competitive fishing vessel is

$$\pi^* = px - C(x, X, K) - L - \mathsf{U}x.$$

If each fisherman chooses $x$ to maximize $\pi^*$, and fishermen, with their boats, enter the industry as long as $\pi^*>0$, the equilibrium conditions become

(6.5) $$f(X) = Kx$$

(6.6) $$p - C_1 = \mathsf{U}$$

(6.7) $$p - \frac{C}{x} - \frac{L}{x} = \mathsf{U}$$

This system is identical with (6.1)–(6.4) for centralized management provided only that the regulating authorities are omniscient enough to fix $\mathsf{U}=\lambda=KC_2/f'$, and $L=KC_3$ at optimizing valves satisfying (6.1)–(6.4).[13]

## APPENDIX

In this appendix we consider some qualitative properties of the system (I.1)–(I.3) or (II.1)–(II.2), particularly as the system is illustrated in Figure 2.

The following qualitative restrictions on the cost function will be assumed: $C_1>0$, $C_2<0$, $C_3\geq0$, $C_{11}>0$, $C_{12}<0$, $C_{13}\geq0$. Also it is assumed that

[12] Regulatory devices other than taxes or fees could, of course, be used, such as direct controls on entry [4, p. 214]. But the resulting large rents may induce investment in gear improvement, more intense fishing, and other operating changes which invite more detailed controls. In practice, such direct controls have almost invariably taken the form of devices that reduce efficiency [4, p. 207].

[13] There are, of course, other important aspects of the problem of optimal fishery regulation. Of particular importance is the problem of regulating mesh size as a means of selective harvesting [1, 14]. The idea behind mesh control is to limit the harvest to the older, and larger, members of the species whose growth rates are considerably slower than those of the younger members. The present paper has also omitted any explicit analysis of the problem of interspecies equilibrium where more than a single species have commercial value. There is also the interesting problem of optimization over time for centrally managed recovery—a problem in Pontryagin control theory. Such extensions will be treated in separate papers.

the demand (or average revenue) function, $\rho(Kx)/Kx$, is monotone decreasing in $Kx$. Hence $\rho' < \rho/Kx$, and therefore from (I.2) $\rho' < C_1$.

We first examine the slopes in phase space along the equilibrium sets $\dot{K} = F(X, K) = 0$ and $\dot{K} = I(X, K) = 0$. Setting $\dot{K} = 0$, differentiating the equations (I.1) and (I.2), and eliminating $dx/dX$ by substitution, we solve for

$$\text{(A.1)} \qquad \frac{dK}{dX}\Big|_{\dot{X}=0} = \frac{(C_1 + xC_{11} - \rho')f' + KxC_{12}}{x(xC_{11} - KC_{13})}$$

If $C_{13} = 0$, or if $KC_{13} < xC_{11}$, the denominator of this expression is positive. Since $C_{12} < 0$, $\rho' < C_1$, with $f' \gtreqless 0$ according as $X \lesseqgtr X^0$ it follows that

$$\frac{dK}{dX}\Big|_{\dot{X}=0}$$

is either (i) always negative or (ii) nonnegative for all $X \leq \hat{X} < X^0$, and negative for $X > \hat{X}$. The curve for $F(X, K) = 0$ in Figure 2 illustrates this second case.

Setting $\dot{K} = 0$, differentiating (I.2) and (I.3), and eliminating $dx/dX$ by substitution, we solve for

$$\text{(A.2)} \qquad \frac{dK}{dX}\Big|_{\dot{K}=0} = \frac{KxC_2C_{11} + K(\rho' - C_1)(xC_{12} - C_2)}{(\rho' - C_1)KC_3 + (\rho' - C_1)x(xC_{11} - KC_{13}) - KxC_{11}C_3}$$

If $C_{13} = 0$, or $KC_{13} < xC_{11}$, the denominator in (A.2) is negative. If $xC_{12} - C_2 > 0$, the numerator is negative, and

$$\frac{dK}{dX}\Big|_{\dot{K}=0}$$

is positive, but if $xC_{12} - C_2 < 0$,

$$\frac{dK}{dK}\Big|_{\dot{K}=0}$$

may change sign. The curve for $I(X, K) = 0$ in Figure 2 illustrates a case in which

$$\frac{dK}{dX}\Big|_{\dot{K}=0}$$

changes signs once, from positive to negative as $X$ increases from zero. From (A.2) it is clear that many other configurations are compatible with the stated qualitative restrictions.

Now consider the directions of motion in phase space of points in the partitions A–E of Figure 2. Differentiating (II.1), or (I.1) and (I.2), with $X$ fixed, gives

$$\text{(A.3)} \qquad \frac{\partial \dot{X}}{\partial K} = F_K = \frac{x(KC_{13} - xC_{11})}{C_1 + xC_{11} - \rho'} \,.$$

The denominator is strictly positive. If $C_{13}=0$, or $KC_{13}<xC_{11}$ then $F_K<0$. It follows that $\dot{X}<0$ for all points above the $F(X, K)=0$ curve in Figure 2, and $\dot{X}>0$ for all points below this curve.

Differentiating (II. 2), or (I.2) and (I.3), with $X$ fixed, gives

$$(A.4) \qquad \frac{\partial \dot{K}}{\partial K} = I_K = -\frac{\delta x}{K}\left\{ \frac{(\rho' - C_1)(KC_{13} - xC_{11})}{C_1 + xC_{11} - \rho'} + \frac{KC_3}{x} \right\}$$

Repeating the previous restrictions on $C_{13}$ and $C_{11}$, we see that $I_K<0$. It follows that $\dot{K}<0$ for all points above $I(X, K)=0$ in Figure 2 and $\dot{K}>0$ for all points below this curve.

In the special case in which price is constant to the exploited resource $p \equiv \rho/Kx$, $\rho' = p = C_1$, and (A.1) reduces to (5.2) in the text, while (A.2) becomes (5.1).

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# THE INFLUENCE OF OWNERSHIP AND CONTROL ON PROFIT RATES

## By David R. Kamerschen*

( In a recent article in this *Review* [8], Robert J. Larner made an invaluable study of the extent of management control among the 200 largest nonfinancial corporations in 1963 and compared his findings with the 1929 Berle and Means study [4]. He concluded that "it would appear that Berle and Means in 1929 were observing a "managerial revolution" in process. Now, 30 years later, that revolution seems close to complete, at least within the range of the 200 largest nonfinancial corporations" [8, pp. 786–87].

This is an important finding. What I should like to do in the present study is to extend Larner's analysis and determine whether the extent of management control exerts an important influence on the rates of return in these firms. I submit that it generally does not and support for this contention forms the primary subject matter of this paper. In addition, the variables that are important in "explaining" inter-firm profit rates are demonstrated empirically. In other words, I accept Stigler's results [13] on profit rates where relevant, and the purpose of this article is to see whether the Larner results make any significant difference or not. ) (To be sure Stigler's results are not quite comparable to ours since he works with industry data while this study uses firm data.)

## I. *The Sample*

Larner obtained data for the 200 largest nonfinancial corporations (1963) from annual reports, proxy statements, *Fortune* [15, 16] and *Moody's* [18, 19, 20]. This list is "composed of firms primarily engaged in manufacturing, mining, merchandising, transportation, and electric,

gas, and pipeline utilities. Banks, insurance companies, and investment companies are excluded" [8, p. 778]. Size is measured in terms of book assets although this overstates the relative size of transportation and utility companies. He retained the Berle and Means distinction between "ultimate control" and "immediate control"[1] and their classification of firms according to the following five types of corporate control (1) privately owned, (2) controlled through the ownership of a majority of the voting stock, (3) controlled through the ownership of a dominant minority of the voting stock, (4) controlled by means of a legal device, and (5) management-controlled.[2] The most significant finding of his study was that management control had substantially increased in each of the major industrial groups [industrials ($N=117$), public utilities ($N=59$), and transportation ($N=24$) companies in 1963] since 1929.[3]

To determine whether the type of ownership and control investigated by Larner influences the profit rate, the following explanatory variables are employed along with the dependent variable, the rate of return after tax on year-end equity ("invested capital").

## II. *The Variables*

In the empirical results variable $X_1$ is always used as the regressor and variables $X_2$-$X_9$ as the regressands. In other words, an attempt will be made to ascertain the proximate determinants of the profit rates. Although subject to controversy, the rate of return after tax on year-end equity ("invested capital") as reported in *Fortune* is used to measure the profit rate. If managers act in the best interests of owners, they will try to maximize this rate of return. In perfectly competitive long-run equilibrium, profit rates on equity, but perhaps not on, say, total capital or assets, should tend toward equality between industries.[4] Although the well-known inconsistencies between accounting and economic profits are always a problem, at least the difficulties created by inflation should be minimized by our choice of data (1959–1964). Moreover, introducing industry growth ($X_7$ and $X_8$) as a variable should correct for differences caused by accelerated depreciation and over (under) statement of profits (assets) among industries with different growth rates. [See 7, p. 7.] Incidentally, the "average" profit rate for the five-

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[1] "This distinction occurred where one corporation controlled another through a dominant minority stock interest" [8, p. 778]. In all the tests presented here "ultimate" control rather than "immediate" control is used.

[2] See [8, 779] for these distinctions.

[3] The proportion of companies in the five groups in 1963 were: (1) 0.0 per cent; (2) 2.5 per cent; (3) 9.0 per cent; (4) 4.0 per cent; and (5) 84.5 per cent. Similar figures prevailed for these groupings as a per cent of assets controlled.

[4] While it is possible to argue that if the above argument is valid, the year-end ratio of equity to assets should be introduced as an explanatory variable, I have not done so. For a study that does included capital structure as an independent variable see [7].

LIST OF VARIABLES EMPLOYED

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$X_1$ = "Average" rate of return after tax on year-end equity ("invested capital"), 1959–64, (unweighted).[a]

$X_2$ = Type of "ultimate control": zero if nonmanagement controlled, one if management controlled.

$X_3$ = Change of "ultimate control": zero if there was no change from 1929 to 1963 in type of control (i.e. from nonmanagement to management controlled or vice versa), one if there was a change.

$X_4$ = Change in size: zero if the company (or predecessor) either not among the 200 largest firms in 1929 or did not exist in 1929, one if it was also one of the 200 largest companies in 1929.

$X_5$[b] = 4-digit concentration ratio for the top 8 firms based on value of shipments, 1963.

$X_6$ Barriers to entry: zero if classified as either "moderate-to-low" or "substantial," one if "very high."

$X_7$[c] = Growth rate 1: average annual per cent change of value added (using compound interest rate formula) by manufacture for industries from 1947–53 to 1957–60.

$X_8$[c] = Growth rate 2: average annual per cent change of value added (using compound interest rate formula) by manufacture for industries from 1957–60 to 1960–64.

$X_9$ = Sales revenue (or operating revenue if transportation or public utility companies), 1963.

$X_{10}$ = Total assets employed in the business at year's end, net of depreciation and depletion.

$X_{11}$ = Invested capital, i.e. net worth (or capital stock, surplus, and retained earnings) at year's end.

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[a]. In a few cases profit figures for all years were not available so that the "average" was based on fewer than six years.

[b]. In a few cases 1954 or 1958 figures were employed because the data were not available.

[c]. In a few cases growth rates of Federal Reserve production indexes for industries over the same periods were employed because the data were not available.

*Source of Data:* Variables 1, 9 [15, 16]; variables $X_2$, $X_3$, $X_4$, $X_{10}$, $X_{11}$, [8 and his unpublished Appendix, 4, 15, 16, 18, 19, 20]; variable 5, [14]; variable $X_6$, [9]; and variables 7, 8, [17].

year period 1959–1963 was also tried with results quite similar to those shown for $X_1$. In addition, the rate of return for only a single year, 1963, was also used. Although the results were generally the same as those for $X_1$, there is a larger element of chance in utilizing a single year's results.

Variables $X_2$, $X_3$, and $X_4$ are the ones most closely related to Larner's study. Using these three variables an attempt is made to determine whether the type of ("ultimate") control, the change of ("ultimate") control, and the change in asset size exert a significant influence on the rate of return. All three of these are 0–1 "dummy" variables separating broad groupings.

$X_4$ is used to indicate change in asset size if the company has joined the largest 200 firms. The likely significance and even the likely sign of this variable is open to question. There are at least three distinct theories that *could* be used to predict the likely consequences of using this variable. First of all, Hall and Weiss [7, p. 25] found "size does tend to result in high profit rates as Baumol [see 3] proposed." If absolute size and rates of return are positively related, it is not unreasonable to speculate that *changes* of size and profit rates are also associated

positively.[5] On the other hand, there is a well-known thesis that small units find it easier to make big percentage increases than do large units. This would suggest that change in asset size and profits may be negatively associated. Finally, there have been a number of studies too numerous to mention supporting the "law of proportionate effect," i.e., the hypothesis that firm sizes are lognormally distributed. However, in most of these studies it was argued that firms grow at the same rate regardless of initial size, measuring growth in asset or sales terms. One of the most recent studies that specifically concludes that there is no relationship between sales and profitability is Stekler's [11, 12].

Almost all of the "new" theories ("new" in quotations since some of these are chronologically not very new) of the firm—e.g., Alchian and Kessel, Baumol, Becker, Cyert and Cohen, Monsen and Downs, Simon, Williamson et al.—suggest that $X_2$ and $X_3$ may be important influences on profit rates in that the goal of profit maximization is likely to be vigorously pursued only when it is consistent with the interests of the management group. When divergences exist, managers will follow policies that maximize their gains rather than those of the enterprise. Thus, the separation of management and ownership that has occurred in the U.S. economy over the last 40 years is thought to have undermined the relevance of the profit maximization model. *Ceteris paribus* management controlled firms presumably would be less concerned with profit maximization than nonmanagement controlled firms. In addition, a change in control from nonmanagement to management control should, *ceteris paribus*, be associated with lower profit rates. In short, most of these "new" theories of the firm have stressed the importance of the nonpecuniary motives of managers as contrasted with the pecuniary motives of owner-managers. While I make no claim that the present study provides a systematic test of these "new" non profit-maximum theories of the firm, it does attempt to determine whether these management-related variables exert a significant influence on the rates of return for the selected firms in the various samples included.

Both variables $X_5$ and $X_6$ are presumed to be structural characteristics that are reflective of monopoly power. That is, both high concentration and high barriers to entry are expected to be associated with high profits since such concentration or barriers allow control over market prices. Both may be used in the same explanatory model since Bain

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[5] Baumol's hypothesis is based on the idea that the large firms have all the alternatives available to small firms plus the investment options requiring capital on a scale sufficiently large so as to exclude small firms. The hypothesis of Baumol is not at all new, since it was put forth by J. Steindl in [10]. Steindl called this the asymmetry principle, and developed it quite extensively. Except for the recent work by Hall and Weiss, time has not dealt kindly with his argument—e.g., H. O. Stekler [11, 12] concludes there is no sales-profitability relationship—but at least he did first put forth the idea.

[2] and Mann [9] have empirically demonstrated that barriers to entry (BTE) and concentration ratios apparently exert independent (and significant) influences on rates of return.

The eight firm concentration ratio (C8) may range in value from 100 to 8/$n$'s of 100, where $n$ is the total number of firms in the industry. On the other hand, there are only three classes to denote the difficulty of entry: "very high," "substantial," and "moderate-to-low." The criteria used by Bain [2] and Mann [9] to determine the height of these barriers were scale economies, product differentiation, absolute costs, and capital requirements.[6] The concentration ratio of the eight instead of the four top firms[7] was used since: (a) It usually makes little difference which is used as they are highly intercorrelated (e.g., in Sample 3 $r = .94$ and Sample 4 $r = .96$); (b) Bain's original work relating the profit rate and industry concentration used this measure—and so did Mann; and (c) The correlation coefficients in the present study usually turn out to be slightly higher with the eight firm ratio.

Some regressions using a 0–1 "dummy" variable with BTE classified as "moderate-to-low" taking on a value of zero, and BTE classified as "substantial" or "very high" taking a value of one were also run; but are not reported here. Since Mann found that there is a distinct difference between the profit rates of the "very high" barriers group and the other two classes, it is not surprising that variable $X_6$ is generally more statistically significant than is this other suggested "dummy" variable. Any of the results mentioned but not presented here—such as those equations involving the four-firm concentration ratio, the other barriers to entry "dummy" variable, other measures of profitability, "average" sales, etc. may be obtained from the author on request.[8]

Variables $X_7$ and $X_8$ are industry growth variables that are introduced to show the effect of special fluctuations or trends. Although some authors use the Federal Reserve index of industrial production to allow for changes in demand and/or costs of production, this study employs value added.[9] Hall and Weiss explain their use of output as an explanatory variable as follows:

> Changes in industry output may reflect either changes in demand or changes in cost that result in movements along the demand curve. Although we cannot distinguish between these, we expect them to have

[6] Bain estimated these barriers for 17 industries and Mann for 30 industries.

[7] The *Fortune* firm data used in this study were matched with the 4-digit SIC by using the industrial classifications for the various firms that were suggested in various Standard and Poor's stock summaries and in [7].

[8] Requests can be addressed in care of the Department of Economics, School of Business & Public Administration, University of Missouri, Columbia, Missouri 65201.

[9] In a few isolated cases where value added figures were not available, the Federal Reserve production index was utilized. For some purposes, such as measuring size, value added is no doubt best since it "compares the value of the factors of production controlled by each firm." [see 8 p. 778 note 2] and [1].

similar effects on profitability. Either an increase in demand or a decrease in costs would result in increased profits unless it is fully anticipated [7, p. 11].

While the sales revenue, variable $X_9$, is included in some of the regressions as an indicator of total size and is generally *statistically* significant, it is not regarded as being *economically* significant. That is, sales revenue as a "size" or "scale" variable is not given much credence here despite its statistical significance. First of all, any regressions involving sales (i.e., total revenue) as an explanatory variable when profits (or total revenue minus total cost), in any form, appear as the dependent variable contains a positive spurious correlation, since the identical variable (total revenue) appears on both sides of the equation. Secondly, multicollinearity is a likely problem—i.e., high intercorrelation among the independent variables—in most of the multiple regressions involving sales. The barriers to entry variable, for example, is closely related to sales (e.g., in Sample 4 $r = .423$). Thirdly, it is highly probable that the barriers to entry variable, $X_6$, would catch many of the "scale" effects. For the absolute capital requirements in the industry was one of the variables Bain and Mann used in assigning firms in their BTE tripartition. Finally, the economic importance of a firm is measured by what it contributes to the national income and to count the contribution of its suppliers is simply double (or multiple) counting. Value-added is a correct flow measure of firm size, just as assets are a correct stock measure. Within any given industry, if the ratio of sales to value-added or to assets runs fairly constant or fluctuates in a random manner, sales may be used as a reasonably good proxy for size, though of course they introduce more statistical error. But when comparing companies across industry lines, sales are an extremely bad measure of size. If they were of any interest, they might as well be used to show profitability, but the ratio between sales and profits is almost meaningless, while the ratio between profits and value added, or profits and investment, is relevant. Unfortunately, value-added data are not readily available. However, this is not as crucial a deficiency as it might be if the flow variables $X_7$ and $X_8$ did not use value-added. Although a statistical problem is involved when the rate of return on equity is correlated with assets or net worth, this cannot be helped and these capital figures are used as independent variables ($X_{10}$ and $X_{11}$). Since the relationship between sales and profitability has been subject to investigation by a number of writers, the sales revenue variable is retained. Although I am personally skeptical about its usefulness, it should be made available for those who are more favorably inclined toward its value. Incidentally, an "average" sales variable for 1959 and 1963 (i.e., $\left[\dfrac{1959+1963\,Sales}{2}\right]$) yielded almost identical results to those based on $X_9$.

$X_{10}$ and $X_{11}$ are total assets and net worth respectively. In general, these variables are highly correlated with sales (the lowest $r$ between sales and either $X_{10}$ or $X_{11}$ in all of the four samples is .74); but can differ significantly for individual industries because of the reasons given above. Hall and Weiss "strongly" support Baumol's thesis that there are "substantial" capital requirement barriers—i.e., size tends to result in high profit later on. Since Baumol defined size in formulating his size-profits hypothesis as the "amount" of owned and borrowed money capital [3, p. 38], total assets are probably a good approximation.

> A definition expressed in asset terms is superior to sales or employment concept of size because it is the difficulty in financing large lumps of assets that limits entry to certain fields. Assets are superior to equity, even in an explanation of [the profit rate on equity], because it is the size of the total lump of capital, however financed, that determines the opportunities available to the firm [7, pp. 8–9].[10]

## III. *The Subsamples*

From Larner's 200 firm sample, several subsamples were drawn containing varying numbers of explanatory variables and firms. Results are presented for four of the samples. (a) Sample 1 ($N = 192$), which in terms of the number of observations ($N$) is the largest but in terms of the number of variables employed is the smallest, contains complete observations for only variables $X_2$, $X_4$, $X_9$, $X_{10}$, and $X_{11}$: (b) Sample 2 ($N = 105$) contains complete observations for variables $X_2$, $X_3$, $X_4$, $X_9$, $X_{10}$, and $X_{11}$. However, $X_4$ could not be used in the regressions as each of the firms had a value of one for this variable. Data for $X_3$, change in control, was particularly difficult to obtain. Larner merely indicated that 87 firms were not among the largest 200 companies in 1929, and he did not indicate the type of corporate control that existed for these firms in 1929: (c) Sample 3 ($N = 112$) contains complete observations for all variables but $X_3$, $X_5$, and $X_6$: (d) Sample 4 ($N = 47$) contains complete observations of all of the eleven variables described in List 1. However, $X_4$ again could not be employed in the regressions for it had a value of one for all the firms included in the sample. Several other subsets of firms were used but are generally neglected here because of space limitations. (However, these results are available upon written request.) For instance, Samples 1 and 2 were run with all the public utilities eliminated. The surprising result was that the simple correlation coefficients and $t$-ratios were approximately the same as with the utilities included. Larner found that although management control was distributed rather

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[10] It should be noted that: (a) they measure size as 1/(log assets); and (b) they argue the significant capital requirement barrier "very likely has a greater effect on profit rates than concentration, the traditional index of market power" [17, p. 25].

evenly among the three industrial groups in 1963, its "highest incidence was among the utilities where it accounted for all but one of the 59 firms."[11]

The reason for having Samples 1–3 even though they do not have complete observations for *all* the variables enumerated in List 1 is to provide the largest sample size possible for several of the key explanatory variables. For instance, in Sample 1 it is possible to obtain coefficients for the key variables $X_2$ and $X_4$ (as well as variable $X_9$) using almost all the companies in Larner's 200 firm sample. Sample 2 provides the largest subsample possible using the above three variables along with $X_3$, another possibly important management variable.[12] $X_3$ and $X_6$ turn out to be the variables that have the least complete coverage. Sample 3 provides the largest subsample possible excluding these two empirically troublesome variables.

## IV. *The Results*

### A. *Simple Correlation Analysis*

Table 1 presents the simple correlation coefficients between the profit rate, $X_1$, and the independent variables, $X_2$–$X_{11}$, described in the "List of Variables Employed" for all four samples. As the previous discussion of the samples indicated, there are not complete observations for all the variables except for Sample 4. Thus, correlation coefficients are not presented for the variables with incomplete observations in the various samples.

Although it is difficult to make a strong case for anything on the basis of zero-order correlation analysis, the bits of evidence presented in Table 1 seem to support several tentative conclusions. (1) The group of management-related variables $X_2$–$X_4$ discussed by Larner do not seem to be consistently important determinants of profit rates. The type of control $(X_2)$ coefficient is negative, as one might expect following the nonprofit maximization hypotheses of Baumol, Becker, Williamson, *et al.*, that emphasize the present separation of ownership and manage-

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[11] [8, p. 785]. He goes on to add: "Yet the public utilities had the lowest incidence of management-controlled firms in 1929 (38 per cent). This drastic change can be explained by the "death sentence" provision of the Public Utility Holding Company Act of 1935, which proscribes pryamiding beyond the second degree among public utility holding companies. Management control was the predominant type of control for the industrials and the transportation companies as well, accounting for 78 per cent of the former and 83 per cent of the latter." Incidentally, I could find only 58 public utilities in his Appendix unless General Telephone and Electronics, listed as an industrial by *Fortune* (AT&T is called a utility, however) is considered a public utility.

[12] Samples 1 and 2 are related in that they focus on variables directly reported by Larner *viz.*, variables $X_2$–$X_5$. It may have been possible to also obtain observations for variables $X_7$ and $X_8$ ($X_9$ is already included) for, say, the 192 firm sample, but not for $X_5$ and $X_6$. Samples 3 and 4 focus on variables $X_5$–$X_8$. The unweighted mean profit rates for the four samples are: Sample 1, $\overline{X}_1 = 9.3$; Sample 2, $\overline{X}_1 = 8.6$; Sample 3, $\overline{X}_1 = 9.1$; and Sample 4, $\overline{X}_1 = 8.3$.

TABLE 1 ZERO-ORDER CORRELATION COEFFICIENTS

(dependent variable, $X_1$, the profit rate)

| Independent Variable | Sample 1 (N=192) | | Sample 2 (N=105) | | Sample 3 (N=112) | | Sample 4 (N=47) | |
|---|---|---|---|---|---|---|---|---|
| | (1) Simple Correlation Coefficient, r | (2) t-Value | (1) Simple Correlation Coefficient, r | (2) t-Value | (1) Simple Correlation Coefficient, r | (2) t-Value | (1) Simple Correlation Coefficient, r | (2) t-Value |
| $X_2$ | −.001 | −0.011 | −.114 | −1.167 | −.065 | −0.686 | −.148 | −1.005 |
| $X_3$ | — | — | .169 | 1.738 | — | — | .271 | 1.887 |
| $X_4$ | −.182 | −2.556 | — | — | −.114 | −1.199 | — | — |
| $X_5$ | — | — | — | — | — | — | .330 | 2.344 |
| $X_6$ | — | — | — | — | — | — | .502 | 3.896 |
| $X_7$ | — | — | — | — | .277 | 3.019 | .404 | 2.962 |
| $X_8$ | — | — | — | — | .252 | 2.730 | .180 | 1.299 |
| $X_9$ | .275 | 3.946 | .417 | 4.660 | .204 | 2.182 | .450 | 3.384 |
| $X_{10}$ | .081 | 1.117 | .183 | 1.886 | .088 | 0.928 | .403 | 2.955 |
| $X_{11}$ | .081 | 1.131 | .179 | 1.849 | .090 | 0.945 | .364 | 2.623 |

*Source*: See "List of Variables Employed."

ment in large corporations, but is never statistically significant at the .10 or better level. The change in control $(X_3)$ coefficient is always positive and is statistically significant at the .10 but not the .05 level. Finally, the results using the change in size variable $(X_4)$ are difficult to rationalize. The coefficient is negative, supporting the thesis that small units find it easier to make big *percentage* increases than do large units, in Samples 1 and 3. However, the coefficient in Sample 1 is (negatively) significant at the .02 level and the coefficient in Sample 3 is not significant. I can offer no entirely satisfactory explanation for this pattern. However, it is true that Sample 3 is composed of firms that on the average, in 1929 and 1963, are larger, *in equity, asset, and sales terms,* than are the mean size firms in Sample 1. It may be that the thesis that smaller firms are more likely to grow faster holds, if at all, only up to a certain critical size level. After that critical level the larger firms may have less difficulty enjoying higher profit rates and may even find it easier than small firms. The relationship between profit rates and size may even become positive beyond a certain size class. For instance, once a firm gets to the size of even the smallest member of the "Big Three" automobile manufacturers—Chrysler—scale and profits may be positively related. Thus, the (unweighted) average annual profit rate (net income to net worth) over the 1950–1960 period as reported in *Fortune* was as follows: General Motors, 21.5 per cent, Ford, 14.5 per cent, and Chrysler, 10.5 per cent. The descending firm sizes are therefore associated with descending profit rates.[13] (2) Somewhat surprising is the statistically insignificant relationship between the profit rate and the eight-firm concentration ratio $(X_5)$.[14] (3) As expected, the barriers to entry variable $(X_6)$ provides an important part of the "explanation" of the level of profit rates. The coefficient is positively significant at the .01 level. (4) The effect of industry growth rates on firm profit rates is generally as expected. However, the correlation coefficient for the growth rate over what should be the more relevant time period, $X_8$, is positive but insignificant in Sample 4. As expected it is positively significant at the .01 level in Sample 3. The simple correlation coefficient between profit rates and $X_7$ is positively significant at the .01 level in

[13] While not computed, this monotonic relationship would almost certainly still hold if American Motors, the smallest of the four major American automobile manufacturers, was also included. This industry is merely given by way of an example. No claim is made that this nice monotone relationship, or anything approaching it, necessarily or even likely holds in all or even a majority of American industries. Incidentally, our results are not necessarily inconsistent with the Hall-Weiss finding that the positive size-profits relationship approximately held over " . . . the whole range of large scale firms observed" [7, p. 19]. For their limited sample of the 400 largest firms in *Fortune* did not permit them to observe the low end of the size-profits curve. Although the firms within their sample ranged in assets from $33 million to $11 billion, 92.3 percent were between $50 million and $2 billion.

[14] This was also true for the 4-firm concentration ratios: the simple correlation coefficient between profits and concentration in Sample 3 is $r = .085$ and in Sample 4 is $r = .327$.

both samples. Since most of the data are for *circa* 1963, it was expected that the growth rate over the 1947–53 to 1957–60 period, $X_7$, would be less relevant than over the 1957–60 to 1960–64 period, $X_8$. (5) Although the sales revenue variable is always positively and significantly related to the profit rate at the .01 level, the relationship is largely specious because of the pronounced positive bias in the equations—i.e., total revenue appears on both sides of the equation. (6) The coefficients for total assets, $X_{10}$, and invested capital, $X_{11}$, are always positive as expected. However, they are insignificant in Samples 1 and 3, and are significant at the .10 and .01 level for Samples 2 and 4 respectively. Because $X_{10}$ and $X_{11}$ are so highly correlated only $X_{10}$ will be employed in the multiple regressions.

### B. *Multiple Correlation Analysis*

Within the single-equation least-squares method relied on in the present study, the analysis may be extended by employing multivariate statistical techniques.[15] These results, which are probably more important than those of Table 1, are presented in Table 2.

Only correlation coefficients for Sample 4 ($N=47$), which has complete observations for all of the eleven variables described in the "List of Variables Employed" are presented in Table 2. This is done for two reasons. First of all, in general, the conclusions suggested by the simple correlation analysis presented earlier would not be significantly altered by the multivariate analysis for the other samples.[16] Secondly, space limitations make it preferable to make these additional results available upon written request to the author.

The following tentative conclusions are suggested by the partial results for Sample 4 found in Table 2: (1) The group of management-related variables $X_2$–$X_3$ have the same signs as in the zero-order analysis; however, $X_2$ is always statistically insignificant. $X_3$ is statistically significant at the .05 level in all five samples, at the .02 (.01) level in equations 8–9 (6, 7). The multiple $R$ for the equation involving these two variables alone is never statistically significant. The multiple $R$ does become significant when either sales revenue ($X_9$) or total assets ($X_{10}$)

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[15] The functions presented here continue to be limited to the linear variety, however. Of course, all the multivariate statistical results must be interpreted in light of any multicollinearity present in the estimating equations. Fortunately, it is no longer necessary to rely on the extremely arbitrary tests involving comparisons of the simple correlations between the independent variables with the multiple $R$ in any multivariate equation involving these variables or the computationally complex factor analysis tests. For a less arbitrary test that does not involve extensive separate computations as in factor analysis, but relies entirely on transformations of statistics that are generated routinely during standard multiple regression computations. See D. E. Farrar and R. R. Glauber [5].

[16] Thus, for instance, in Samples 1–3 variable $X_9$ is positively significant at the .05 level in almost all the relevant multiple regressions.

TABLE 2—MULTIPLE CORRELATION COEFFICIENTS RELATING THE PROFIT RATE TO VARIOUS EXPLANATORY VARIABLES: SAMPLE 4 ($N=47$)
(Dependent Variable, $X_1$ The Profit Rate)

| Equation Number | Partial Coefficients of Determination $r_2$, and (t-values) of: | | | | | | | | Multiple Correlation Coefficient Adjusted for Degrees of Freedom, $\bar{R}$, and (F Statistic) |
|---|---|---|---|---|---|---|---|---|---|
| | $X_2$ | $X_3$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ | $X_{10}$ | |
| 1 | .068 (−1.796) | .117 (2.417) | | | | | | | .312 (3.479) |
| 2 | .067 (−1.763) | .116 (2.378) | | | | | .201 (3.293) | | .512** (6.453) |
| 3 | .066 (−1.745) | .112 (2.327) | | | | | | .157 (2.829) | .470** (5.356) |
| 4 | | .091 (2.073) | | .165 (2.918) | | | .088 (2.037) | | .583* (8.892) |
| 5 | | .090 (2.068) | | .223 (3.512) | | | | .105 (2.244) | .593* (9.328) |
| 6 | | .152 (2.708) | .001 (0.229) | .190 (3.102) | | .050 (1.477) | | | .562** (5.255) |
| 7 | .038 (−1.260) | .163 (2.791) | .010 (−0.624) | .206 (3.226) | .092 (2.015) | .025 (1.016) | | | .603* (5.382) |
| 8 | .030 (−1.096) | .138 (2.497) | .000 (−0.017) | .084 (1.888) | .113 (2.230) | .002 (0.303) | .107 (2.162) | | .646** (5.705) |
| 9 | .026 (−1.030) | .133 (2.451) | .000 (0.025) | .134 (2.457) | .107 (2.162) | .002 (0.283) | | .114 (2.235) | .649** (5.788) |

\* Significant at the 1 per cent level.
\*\* Significant at the 5 per cent level.

Significance Levels of Two-Tailed t-Tests for:

| | $\alpha=.10$ | $\alpha=.05$ | $\alpha=.02$ | $\alpha=.01$ |
|---|---|---|---|---|
| 40 degrees of freedom | 1.684 | 2.021 | 2.423 | 2.704 |

Source: See "List of Variables Employed".

are included in the equation. Apparently if there was a change in ultimate control, this had a favorable influence on the profit rates. And in our sample, this is almost invariably a change from nonmanagement to management controlled rather than vice-versa. This result is in sharp contrast to the usual hypothesis, implicit in almost all the new theories of the firm that suggest that the increasing separation of ownership and management should be associated with less emphasis on profit maximization and more on other goals. Our findings suggest a positive and significant association between profit rates and a change from nonmanagement to management control. Unfortunately, this is not a rigorous text, since following Alchian and Kessell, *et al.*, firms, faced with profit constraints for one reason or another, can enjoy higher nonprofit amenities—thicker carpets, prettier secretaries, greater job security, etc. The data do not allow us to test these theories more precisely.

(2) The simple correlation results showing no significant relationship between profits and concentration is confirmed in the multivariate analysis. While a number of studies, e.g., Stigler [13, esp. pp. 66–71], have found results similar to ours, the prevailing hypothesis in economics is that the average rate of return should be greater for monopolies than that of competitive industries. Apparently our results are at variance with this thesis. The only rationale that I can offer for our findings is that: (a) Sample 4 may be unusual with respect to the average of mean level of concentration. In particular, the unweighted eight (four) firm concentration mean of 69.8 (52.6) may be on the high side; (b) The problem of colinearity, especially between C8 and BTE where $r_{5,6} = .439$, if considered serious means the estimated parameters have a low degree of precision. In other words, the C8 is to some extent dependent on BTE. It is usually only when the other elements of competitive structure—capital cost, product differentiation, etc.—are not included in the analysis, that C8 turns out to be an important determinant of profitability; and (c) The 4-digit industry concentration ratios employed may not be entirely appropriate for the firm data used here for a number of reasons.

(3) The BTE variable emerges as an important force in "explaining" firm profit rates. The coefficient has the expected (positive) sign and is statistically significant at the .01 or better level in all the equations in which it appears, save numbers 8 and 9 in which it is significant at the .02 level.

(4) Rather surprising is the fact that $X_8$ is never statistically significant, while the apparently less relevant, in terms of the time period in question, growth rate variable $X_7$ is significant at the .10 level in all three equations in which it appears and at the .05 level in two of these cases.

(5) As expected, the coefficients for sales revenue and total assets are positively significant at the .05 level in two of the equations in which they appear and at the .01 level in the other two cases. In the other case, the coefficient is significant at the .05 level. The reasons for not placing too much emphasis on the sales revenue variable were mentioned earlier. However, the asset size-profitability results are interesting. They lend support to the important conclusions of Hall and Weiss [7, p. 25] that:

> ... size does tend to result in high profit rates as Baumol proposed, that there is a significant though probably not enormous capital requirements barrier as a result, and that this barrier very likely has a greater effect on profit rates than concentration, the traditional index of market power.

(6) Finally, a number of interesting conclusions emerge from examination of the overall equations. For instance equations 8 and 9 both employ all the independent variables 2–8, while 8 also uses sales revenue and 9 uses total assets. The only differences that result are: (a) the sign for the concentration, $X_6$, coefficient is negative in equation 8 and positive in equation 9, but since both are insignificant this may be the result of chance; and (b) the BTE coefficient goes from .10 level statistical significance in equation 8 to the more conventionally acceptable .05 level in equation 9. In short, equation 9 employing total assets, as expected, gives much more sensible and meaningful economic results although there is little to choose between the two in terms of the often misused $\bar{R}$ or $F$ statistic comparisons. By the $\bar{R}$ test these two equations "explain" more of the variance in profitability than any of the other equations. However, in many senses, and in particular comparing the $F$ statistic associated with the overall equation, equations 4 and 5 are the most satisfactory ones. Using only three independent variables, the equations are able to explain a great deal—in fact, they are the only equations in which $R$ is statistically significant at the .01 level by the usual $F$ tests. All the individual coefficients are statistically significant at the .05 level whereas sales or total assets are significant at the .01 level. Thus, the change of control BTE, and total assets (or the less economically relevant sales revenue) variables are able to "explain" a good part of the variability in interindustry profit rates.

## V. Summary and Conclusions

On the basis of my evaluation of the model presented relating the rate of return with several explanatory variables, I conclude: (a) While Larner's study which corroborates the Berle-Means thesis of increasing management control in the U.S. economy is an important contribution, two of these management-related variables with which he was concerned—type of control and change in size—do not appear to "explain"

very much of the variation in profit rates among the 200 largest non-financial companies included in his sample.[17] However, the change of control coefficient is positively significant in all of the multiple regressions, which while not specifically or systematically tested for in this study is apparently at variance with the "new" nonprofit-maximization theories of the firm that stress the importance of the nonpecuniary motives of managers. (b) Apart from the change of control, the variables which seem to be the proximate determinants of rates of return and for which substantial theoretical support can be given are total assets, barriers to entry, and the industry growth rate. Another variable which was statistically important, but which is theoretically unappealing, is the level of sales revenue.⟩

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[17] Of course, the usual caveat applies to this as well as our other findings, *viz.*, that the conclusion should not be extrapolated to firms smaller than the 200 largest. And, of course, a number of our conclusions are based on samples and not the entire "universe" of 200 firms. In addition, Mr. Larner wrote me (February 3, 1968) of a change in classification in two of his firms from management to owner controlled. Although he indicated both were borderline cases in which the "control situation is not obvious or clear-cut," I redid all the results and found few significant changes. I have therefore retained the original results. The main changes with the new classification are: (1) $X_2$ in Table 2 now becomes more consistent by not being significant in equations 1–3 as well as in equations 6–9; (2) $X_3$ generally becomes more significant. It is significant at the .05 level in Table 1's Sample 4, and at the .02 (.01) level in equations 2, 3, and 4(1) in Table 2; and (3) $X_7$ ($X_9$) falls below the .05 significance level in Table 2's equation 7(4).

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# POPULATION AND INDUSTRIAL DEVELOPMENT: SOME EVIDENCE FROM TRADE PATTERNS

DONALD B. KEESING*

To what extent do "internal" and "external" economies of scale handicap small countries in their industrial development? Evidence bearing on this question is reported here, based on preliminary research on the relationship between countries' population and their international trade. The hypothesis investigated is that countries with small populations experience a comparative disadvantage in many important manufacturing industries, uncompensated by a comparative advantage in others.[1] Cross-national regressions are used to identify industries in which small countries seem, from their export and import patterns, to experience a comparative disadvantage.

My regressions are closely akin to those applied previously to output and imports, but not to exports, by Chenery [1] and subsequently, among others, by Maizels [2] and the United Nations [6]. Unlike them, however, I am not chiefly interested in systematic associations between per capita income and manufacturing patterns. Instead, I am seeking further evidence on the country–population effects already implied by some of the regression results of Chenery and the United Nations.

## I. The Regression Technique

My regressions were log-linear and explained per capita exports and imports of a country by its per capita gross domestic product and its population:

$$\log \left( \frac{X_i}{N} \right) \left[ \text{or} \log \left( \frac{M_i}{N} \right) \right] = \log a_i + b_{1i} \log \left( \frac{Y}{N} \right) + b_{2i} \log N + \epsilon_i$$

[1] Comparative advantage (or disadvantage), unfortunately, lacks an unambiguous operational definition in a world with many commodities, countries, and price-distorting influences. Many economically meaningful yardsticks can be conceived for ranking countries in relation to one commodity, or commodities in one country, but some involve data not observable in practice, and others involve observations influenced by distortions. Here I use the time-honored but confusing terms to indicate that in a given commodity, a small country (in terms of population) can expect to experience a net trade surplus or deficit compared to a large country at the same income level. A more precise lexicon for describing trade, price and efficiency phenomena loosely lumped under "comparative advantage" is urgently needed by those of us who are attempting empirical work.

A. Countries considered "developed" (per capita GDP over $700 in every case, and over $900 except for Japan):

| | |
|---|---|
| Australia | Israel |
| Austria | Italy |
| Belgium-Luxembourg | Japan |
| Denmark | Netherlands |
| Finland | Norway |
| France | Sweden |
| Germany (Fed. Rep.) | Switzerland |
| Iceland | United Kingdom |
| Ireland | United States |

B. Countries included in the larger sample but not in the "developed" sample (per capita GDP under $700 in every case):

| | |
|---|---|
| Brazil | Malaysia (Malaya only) |
| China (Taiwan) | Nigeria |
| Greece | Portugal |
| Honduras | Spain |
| Iran | Trinidad and Tobago |
| Korea (Rep.) | Turkey |
| Libya | |

where $X_i$ and $M_i$ stand for exports and imports of the $i$th product, $N$ represents the country's population, and $Y$ stands for its gross domestic product.

The regressions were applied to 40 trade categories of manufactured products that together account for a large majority of all trade in manufactures.[2] Empirical observations for 1964 were taken from 31 countries for which detailed commodity trade statistics were available. Besides treating the countries as a single group, I ran the regressions separately for the 18 most developed countries in the sample.[3] The countries are shown in Table 1. I took into account zero or unreported items of trade to stabilize the sample and give weight to zero entries.[4]

Country-size influences were detected by statistically significant deviations from zero of the "size elasticity," Chenery's term for the least squares regression estimate of the partial elasticity with respect to population. A two-tailed $t$ test was employed at the .05 level of significance. When the size elasticity turned out to be significantly positive for exports, or significantly negative for imports, I interpreted this result to

[2] The products are shown below in Table 2.

[3] Data were taken from United Nations sources, trade statistics from [3] and population, gross domestic product and exchange rates for converting GDP from [4]. I expected, and found, discontinuities in trade patterns between those of developed and less developed countries. Other people may disagree with my assignments of countries to the "developed" category.

[4] I entered the items as one dollar each; zero has no logarithm.

mean that a small country seemed to experience a comparative disadvantage in the industry. The reverse patterns were taken to indicate a comparative advantage.

## II. *Problems in Interpreting the Results*

Several important problems limit the significance of the results. First, there appears to be an inverse correlation between population and per capita natural resources, especially among richer countries.[5] Where people are sparsely settled they are able to export goods and services based on surrounding natural resources, while crowded populations must export manufactures to meet their needs for food and raw materials. Systematic differences in per capita natural resources can be explained to some extent in terms of the interplay of natural geography and differential population growth.[6] The resource situation among advanced countries also reflects the results of large-scale international migration and "polarized" industrial growth, influenced by such factors as the availability of coal, transport facilities and industrial know-how. Thus, a comparative disadvantage of small countries in manufacturing industries may be merely the reverse side of their superior per capita natural resources; or it may mirror historical circumstances that will not be repeated among poorer countries as they industrialize. The same comparative disadvantage could mean, however, that a populous country, for reasons connected with its size, is able to produce a cheaper or better product than a smaller country, or that a larger country enjoys systematic scale advantages in marketing exports.

As a further limitation, regressions tend to pick up the differences in average behavior between countries with large and small populations, but they do not accord special weight to exceptional performances by the smaller countries. Economies of scale may be sufficient to force each

[5] For the 18 developed countries in the sample, the Spearman coefficient of rank correlation between territory per capita and population is −.48 (if Canada and New Zealand are included it is −.45). By contrast, for the 13 poorer countries in the sample it is .07, and for 97 sovereign non-Communist countries with at least 50,000 people each, not including the 20 countries just considered, the rank correlation is −.16. Again, for 15 developed countries from the sample, there is a −.46 rank correlation between population and the percentage of GDP originating in agriculture, forestry and fishing. These comparisons are based on recent U.N. data [4] [5] [7].

[6] What is really needed, of course, is a whole theory of how countries and their populations come about. One possibility is that "natural" geographical units tend to become countries; and in continental land masses these units vary more in population then in territory. Thus, countries with small populations have more land per person and, in consequence, tend to have more minerals, agricultural and forest resources, tourist attractions and strategic geography (useful for obtaining foreign aid). Densely populated yet very small countries are mostly tropical islands, which at least have tourist attractions. Industrial success may also lend to expansion, immigration and high rates of population growth.

small country to specialize in different products. In that case, regression results for each individual product may be dominated by the general lack of success of small countries, even though one or a few of these countries are able to specialize successfully in each product. The resulting bias grows as products are disaggregated.

In other respects, the regression technique could be expected to understate associations between country size and trade patterns. Scale effects do not necessarily channel themselves into the size elasticity, but may be captured instead by the partial elasticity with respect to per capita income. If a product exhibits a positive income elasticity of demand, as most products do, its market will grow with per capita income. Therefore, the size elasticity will understate, and may fail to pick up, scale effects connected with the size of the local market. In this light, significant size elasticities represent especially impressive evidence.

Other things equal, a large country can be expected to trade internationally a smaller proportion of its output than a small country, because more of its trade counts as national. This effect depresses below zero the expected size elasticities for both exports and imports. Therefore, evidence based on significantly negative size elasticities must be discounted, but evidence based on significantly positive elasticities gains added weight.

Export and import elasticities are interrelated. If a country succeeds in exporting because of scale advantages, it is enabled to import more freely. Thus, there should be a cross-influence pushing export and import elasticities in the same direction, with comparative disadvantages in some industries being offset by comparative advantages in others. My hypothesis is that, despite these cross-influences, small countries find their comparative advantages outside the manufacturing sector.

There are also problems with the form of the equations themselves. Population ($N$) appears in both explanatory variables; but for the countries sampled these variables are uncorrelated in log form. On a theoretical plane, the log-linear equation describes a smoother, more continuous relationship between population and exports (or imports) than one would expect in a relevant general equilibrium model. In a programming model one would expect a discontinuous pattern of association; for example, an industry with intermediate scale characteristics might tend to locate in and export from medium-sized countries. Discontinuities in the relationship between trade patterns and population would probably reduce the statistical significance of the elasticities measured here, blurring my results.

If imports behaved like the average of all goods, the income elasticity of demand for imports, and by extension the "average" partial elasticity

of exports with respect to income, would be unity. Tests of significance for elasticities with respect to income are, therefore, computed here on the basis of deviations from an expected value of one.

### III. *Empirical Findings*

Table 2 summarizes the results for each of forty manufactured products based on four equations, that is, export and import equations applied to the sets of 31 and 18 countries.[7]

Every product except one showed significant country-size effects in at least one equation; and all but four products showed them in at least two equations.[8] Country-size effects appeared more frequently in regressions based on the sample of richer countries than in the full sample. When poor countries were included, country-size effects tended to be overshadowed by the influences of per capita income; these income effects were especially strong in exports, where 38 of 40 products showed partial elasticities significantly greater than one. Among the developed countries, by contrast, effects of per capita income were swamped by those of population.

All told, 105 of the 160 equations turned up significant country-size effects. In all but one case, these effects appeared to operate in a direction unfavorable to a small country. Over half these instances—involving as many as 36 of 40 products in the sample of richer countries—consisted of significantly positive elasticities on the export side.[9] The one exception offers little comfort to small countries: large countries appeared in one sample to import significantly more railroad equipment than small ones!

Another interesting result was that manufactures seemed to exhibit similar export patterns from one product to another. Even standard errors were characteristic. The similarities were especially pronounced for exports of different kinds of machinery and transport equipment. One possible interpretation would be that there are large "external" economies among these industries, or at least among exports of the products.

These regression results, crudely interpreted, overstate the size handicap of small countries, because in most industries there turn out to be one or a few small countries that are successful net exporters. Excep-

[7] Four-digit trade data were unavailable for Sweden and for Trinidad and Tobago, so that these two countries were excluded from the computations in two four-digit categories, rubber tires and cement.

[8] The one product which showed no significant size effect was cement, in which there is less trade than in any of the other 39 products. The extraneous influence of heavy transport costs probably accounted for the poor explanatory power of the equations in this case.

[9] In the case of exports, estimated size elasticities that were statistically significant were also quite large; all but one equalled at least unity, and they ranged from 0.95 (paints, pigments and varnishes) to 2.20 (railway vehicles and equipment in the eighteen-country sample).

TABLE 2—SUMMARY OF REGRESSION RESULTS

| SITC Category | Description | Significant Size Effects[a] | | | | Significant Income Effect[c] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Exports | | Imports | | Exports | | Imports | |
| | | 31 c. | 18 c. | 31 c. | 18 c. | 31 c. | 18 c. | 31 c. | 18 c. |
| 266 | Synthetic fiber | | x | | x | x | | x[d] | |
| 332 | Petroleum products | | x | x | x | x | | | |
| 512 | Organic chemicals | | x | | | x | | x[d] | |
| 533 | Paints, pigments, varnishes | | x | x | x | x | | x | |
| 541 | Drugs, medicines | | x | x | x | x | | x | x |
| 554 | Soaps, detergents | | x | | x | x | | | |
| 561 | Fertilizers | | x | | | x | | | |
| 581 | Plastics | | x | | x | x | | | |
| 629.1 | Rubber tires | | x | x | x | x | | | |
| 641 | Paper, paperboard | | | x | x | x | | | |
| 642 | Paper products | | | x | x | x | | x | |
| 651 | Textile yarn | | x | x | x | x | | | |
| 652 | Cotton fabrics | x | x | x | x | | | | |
| 653 | Other textile fabrics | x | x | x | x | x | | | |
| 661.2 | Cement | | | | | | | | |
| 664 | Glass | x | x | x | x | x | | | |
| 674 | Steel plate, sheet, universals | x | x | | x | x | | | |
| 684 | Aluminum | | x | x | x | x | | | |
| 692 | Metal containers | | x | | x | x | | | |
| 711 | Power machinery | x | x | x | x | x | | x | |
| 712 | Agricultural machinery | x | x | x | x | x | | | |
| 714 | Office machinery | x | x | | | x | | | |
| 715 | Metalworking machinery | x | x | | | x | | | |
| 717 | Textile weather machinery | x | x | | x | x | | | |
| 718 | Special industry machinery | x | x | | x | x | | | |
| 719 | Other non-elec. machinery | x | x | | x | x | | | |
| 722 | Elec. power machinery and switchgear | | x | | x | x | | | |
| 723 | Elec. distribution machinery | | x | | x | x | | | |
| 724 | Telecommunications equipment | x | x | | x | x | | | |
| 725 | Household elec. appliances | x | x | | x | x | | | |
| 729 | Elec. machinery & equipment n.e.s. | x | x | | x | x | | | |
| 731 | Railway vehicles & equipment | x | x | x[b] | | x | | | |
| 732 | Motor vehicles | x | x | x | x | x | | | |
| 733 | Non-motor road vehicles | | x | x | x | x | | x | |
| 734 | Aircraft | x | x | x | x | x | | | |
| 821 | Furniture | | x | x | x | x | | | |
| 841 | Clothing | | | x | x | x | x[d] | | |
| 851 | Footwear | | x | | | x | | | |
| 861 | Instruments | x | x | | | x | | | |
| 894 | Toys, sporting goods | x | x | | | x | | | |

[a] x indicates partial elasticity with respect to population significantly positive for exports, or negative for imports.

[b] Partial elasticity with respect to population significantly positive for imports.

[c] x indicates partial elasticity with respect to income significantly greater than one for exports, or less than one for imports.

[d] Partial elasticity with respect to income significantly less than one for exports, or greater than one for imports.

TABLE 3—SOME TRADE PATTERNS IMPLIED BY REGRESSION RESULTS[a]

| Country Sample from Which Results Were Taken | Per Capita GDP (US $) | Per Capita Trade (US $) with Population of: | | | |
|---|---|---|---|---|---|
| | | 10 Million | | 50 Million | |
| | | Exports | Imports | Exports | Imports |
| 31 countries | 100 | 0.01 | 8.02 | 0.06 | 5.32 |
| 31 countries | 600 | 0.67 | 35.16 | 3.38 | 23.73 |
| 31 countries | 2000 | 56.43 | 116.96 | 297.41 | 82.82 |
| 18 countries | 1000 | 24.38 | 76.25 | 151.06 | 39.97 |
| 18 countries | 2000 | ·27.79 | 146.67 | 223.72 | 73.25 |

[a] Trade patterns are those for the aggregate of the 40 manufactured products shown in Table 2.

tional is a case such as motor vehicles, where only the six industrial countries with populations over 48 million were net exporters in 1964.

An interesting aspect of the results is the balance-of-payments implication that most countries, large or small, rich or poor, could expect to experience a sharp trade imbalance for the 40 manufactured products. For small and poor countries the balance would be negative. These expectations can be quantified by computing, for countries of specified dimensions, the exports and imports implied by each set of fitted equations. Table 3 summarizes five sample results.

These results are exaggerated compared to those that would be achieved using broader trade categories, because of the effects on the regressions of specialization. Nevertheless, the results are not wholly at variance with actual trade balances in manufactures. In 1964, among 20 non-Communist countries with per capita income levels at least equal to Japan's,[10] only seven exhibited a favorable trade balance in manufactures (SITC 5–8). They were the six with the largest populations and Belgium-Luxembourg.

Four others had exports of manufactures at least three quarters as large as imports: Switzerland, Sweden, Austria, and the Netherlands. Like Belgium, they are countries of moderate size (5.8 to 12.1 million people in 1964, with home markets equivalent to $8.5 billion to $17 billion). All are centrally located in a heavily populated, industrialized part of the world notable for comparatively open trade and migration policies and a considerable degree of economic integration.

## IV. Conclusions

The regression results strongly confirmed the hypothesis. Small countries appeared to experience a comparative disadvantage in most

[10] The countries in my "developed" sample plus Canada and New Zealand.

of the important manufacturing industries, uncompensated by a comparative advantage in others.

It is not clear from these results that small countries are seriously handicapped in their industrial development. The findings could be merely the reverse side of a comparative advantage for small countries in goods and services based on natural resources. The regression method is also likely to yield deceptive results when small countries are overcoming scale barriers through specialization.

It is plain, however, that there are systematic differences in countries' trade patterns as a function of their populations. Further research using more refined tools is clearly warranted.

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# THE EFFECT OF UNION STRENGTH ON THE U.S. "PHILLIPS CURVE"

### By GAIL PIERSON*

In this study the U.S. manufacturing sector is divided into groups of strongly unionized and weakly unionized industries in order to evaluate the impact of union strength on the relationship between wage rate changes and unemployment. The basic model is patterned after that of George Perry [5], who found the annual percentage change in average straight-time hourly earnings in the U.S. manufacturing sector $(W^*)$ to be significantly related to the inverse of the unemployment rate $(1/U)$, the lagged annual percentage change in the consumers' price index $(C^*_{-1})$, lagged profits after taxes as a percentage of stockholder's equity $(P_{-1})$, and the change in the same profits variable $(\Delta P)$. The construction of the variables and their sources are similar to those of Perry and are described in the Appendix; regressions are fitted to quarterly data covering the period 1953(I)–1966(II).

As a prelude to the analysis of the effect of union strength, the appropriateness of the model to the manufacturing sector as a whole in the period 1953–1960, one of the periods covered by Perry's study, was verified, but the extension of the data period through 1966(II) revealed that the lagged profits variable was no longer significant. The simple correlation between percentage wage changes and lagged profits is much lower when the later years are added and since there is correlation between lagged profits and unemployment, the latter term picks up most of the remaining influence of profits. Accordingly, the lagged profits term was dropped from the equation.[1] In addition, it was necessary to include a dummy variable $(S)$ at the beginning of 1962 to account for the effect of wage-price guideposts. The best equation obtained for the 1953(I)–1966(II) period was:

$$(1) \quad W^* = -.0598 + .2836C^*_{-1} + 17.6576\frac{1}{U} + .6762\Delta P - 1.0164S$$

$$(.1187) \qquad (2.2240) \qquad (.3207) \qquad (.2513)$$

$$R^2 = .66$$

$$\text{s.e.} = .77$$

[1] The squared simple correlation coefficient $(R^2)$ between percentage wage changes and

Perhaps the most interesting result of this equation is the indication that the annual rate of change in wages has been reduced by about one percentage point since 1962(I).[2]

To disaggregate into strong union and weak union groups, 19 two-digit manufacturing industries were ranked according to 1958 estimated ratios of unionization.[3] While these ratios are the best available indicators of union strength, they are not ideal; union strength may be derived from internal political factors such as cohesiveness or from financial considerations rather than from the percentage of workers covered. In addition, the percentage of workers covered by collectively bargained agreements is not synonymous with union membership. It is hoped, however, that the unionization ratios capture some of the important determinants of union strength. The ratios are given in Table 1 below.

TABLE 1—UNIONIZATION RATIOS

| Petroleum Refining & Allied Industries | 90 |
|---|---|
| Primary Metals | 89 |
| Transportation Equipment | 87 |
| Rubber & Misc. Plastics | 81 |
| Stone, Clay & Glass | 78 |
| Paper & Allied Products | 76 |
| Electrical Equipment & Supplies | 73 |
| Fabricated Metals | 71 |
| Machinery, except Electrical | 68 |
| Food & Kindred Products | 68 |
| Printing, Publishing & Allied Industries | 65 |
| Chemicals & Allied Products | 65 |
| Tobacco Manufacturing | 63 |
| Apparel & Related Products | 60 |
| Instruments & Related Products | 52 |
| Furniture & Fixtures | 50 |
| Leather & Leather Products | 49 |
| Lumber & Wood, except Furniture | 44 |
| Textile Mill Products | 30 |

*Source:* [2, p. 347].

lagged profits for the total manufacturing sector fell from .33 in the period 1953(I)–1960(III) to .15 in 1953(I)–1966(II) and that between the unemployment term and lagged profits rose from .19 to .29.

[2] Results similar to this have been found by others. Perry suggested that a shift may have occurred after observing that his 1948-60 equation over-predicted 1961-63 [5, pp. 305-06]. Robert M. Solow reports that Perry's equation overestimates 1965 wage changes by about 1.7 percentage points and describes work by Frank Brechling indicating a difference of about 1.5 percentage points in mid-1965. Solow also points out that one should not be too hasty in attributing the lower rate of wage change to the guideposts for two reasons: the past period of economic slack may have caused a change in expectations about inflation; and the inclusion of hidden unemployment may reduce the difference as is suggested by N. J. Simler and A. Tella. Solow, however, prefers the guideposts interpretation. See [7].

[3] As calculated by H. M. Douty [2]. These ratios are defined as the ratio of production and

The first ten industries were designated group I and the remaining nine group II. It was felt that this grouping was consistent with a strong unionism-weak unionism dichotomy since the average unionization ratio is 78 per cent for group I and 53 per cent for group II.[4] To pursue possible differences even further, subgroups were chosen from the two groups for a greater divergence in average unionization; the four most strongly unionized in the strong union group were designated group A, with average unionization ratio of 87 per cent, and the five most weakly unionized in the weak union group were designated group B, with average unionization ratio of 45 per cent.

*Groups I and II*

The percentage changes in wages in group II were generally below those in group I up to mid-1963. The average annual change over the period for group I was 3.62 per cent and the average profits rate was 10.7 per cent, compared to 2.97 per cent and 10.3 per cent, respectively, for group II. The results using all variables in the basic model to explain the two wage series were:[5]

$$(2) \qquad W_I^* = -.2027 + .3057 C_{-1}^* + 16.0895 \frac{1}{U} + .0487 (P_{-1})_I$$

$$\phantom{(2) \qquad W_I^* =} (.0967) \qquad (2.5775) \qquad (.0878)$$

$$-.1027 \Delta P_I - 1.3807 S$$

$$\phantom{-.} (.2522) \qquad (.2181)$$

$$R^2 = .79$$
$$\text{s.e.} = .65$$

$$(3) \qquad W_{II}^* = -1.9184 + .0666 C_{-1}^* + 9.1712 \frac{1}{U} + .3042 (P_{-1})_{II}$$

$$\phantom{(3) \qquad W_{II}^* =} (.1266) \qquad (2.4329) \qquad (.0904)$$

$$+.0539 \Delta P_{II} - .7070 S$$

$$\phantom{+.} (.3057) \qquad (.3158)$$

$$R^2 = .44$$
$$\text{s.e.} = .82$$

related workers in manufacturing establishments where a majority are covered by collectively bargained agreements to total production and related employment.

[4] By coincidence, it developed that group I includes the Eckstein-Wilson "key group" plus (or minus) the industries they subsequently discovered should have been added (or deleted) on the basis of inherent similarities, with the exception of chemicals, which they found to be on the margin on the group. See [3].

[5] In these and the following regressions the subscripts indicate variables that are calculated for that group of industries. Details of calculations are given in the Appendix.

The small size and insignificance of the coefficients on lagged profits and change in profits in the group I regression persisted in various experiments with current profits, lagged change in profits, etc. While the squared simple correlation coefficient between percentage wage changes and lagged profits is .24, that between the unemployment term and lagged profits is .45, making it difficult for the latter to appear significantly in the presence of the unemployment term. Omitting the profits terms altogether gave the following best result for group I:

$$(2a) \qquad W_I^* = .0921 + .3336 C_{-1}^* + 17.0042 \frac{1}{U} - 1.3987S$$

$$(.0806) \qquad (1.8596) \qquad (.1975)$$

$$R^2 = .79$$

$$\text{s.e.} = .65$$

Lagged profits are significant in the group II regression (lagged profits and unemployment are uncorrelated) but the lagged cost of living and change in profits terms are not. Omitting these two terms gave:

$$(3a) \qquad W_{II}^* = -1.9966 + 9.1158 \frac{1}{U} + .3235(P_{-1})_{II} - .7589S$$

$$(2.3911) \qquad (.0850) \qquad (.2975)$$

$$R^2 = .43$$

$$\text{s.e.} = .83$$

Finally, in an effort to improve the explanation of the group II wage changes, an Eckstein-Wilson "spillover" equation was tried, with good results:

$$(3b) \qquad W_{II}^* = -2.2352 + .5430 W_I^* + .3135(P_{-1})_{II}$$

$$(.0715) \qquad (.0615)$$

$$R^2 = .59$$

$$\text{s.e.} = .71$$

Using $W_I^*$ lagged was not as satisfactory and neither $1/U$ nor $S$ was significant in the presence of $W_I^*$, which is as expected since they are already included in the determination of $W_I^*$. The better fit from the spillover equation corroborates the Eckstein-Wilson finding that key group wage changes are an important determinant of other wage changes.[6]

[6] To check the direction of causation implied by equation (3b), the regression $W_I^* = f[W_{II}^*, (P_{-1})_I]$ was performed; the result had low explanatory power ($R^2 = .13$) and lagged profits had a negative coefficient. We conclude that the causation runs as indicated, from the more strongly unionized sectors to the other sectors.

*Groups A and B*

Groups A and B provide a sharper contrast in union strength. The average annual percentage change in wages in group A was 3.79 per cent and for group B, 2.73 per cent, a wider difference than in the case of groups I and II. Profit rate differences were also greater: 11.6 per cent for group A and 7.6 per cent for group B. Using all variables gave the following:

$$
(4) \qquad W_A^* = .1760 + .4647 C_{-1}^* + 13.2934 \frac{1}{U} + .1023(P_{-1})_A
$$

$$
\qquad (.1255) \qquad (3.3172) \qquad (.0901)
$$

$$
\qquad + .8368 \Delta P_A - 1.9764 S
$$

$$
\qquad (.2551) \qquad (.2748)
$$

$$
\qquad R^2 = .72
$$

$$
\qquad \text{s.e.} = .85
$$

$$
(5) \qquad W_B^* = -.8054 + .2175 C_{-1}^* + 4.9319 \frac{1}{U} + .3193(P_{-1})_B
$$

$$
\qquad (.1120) \qquad (2.5293) \qquad (.0753)
$$

$$
\qquad + .3319 \Delta P_B - .7923 S
$$

$$
\qquad (.2191) \qquad (.3270)
$$

$$
\qquad R^2 = .46
$$

$$
\qquad \text{s.e.} = .80
$$

In the group A regression, the profits terms enter more strongly than they did for group I; the coefficient on the change in profits is significant but that on lagged profits is not, reflecting the substantial correlation ($R^2 = .43$) between unemployment and lagged profits. Omitting the latter gave:

$$
(4a) \quad W_A^* = .4947 + .4541 C_{-1}^* + 15.8010 \frac{1}{U} + .7747 \Delta P_A - 1.9430 S
$$

$$
\qquad (.1255) \qquad (2.4821) \qquad (.2499) \qquad (.2740)
$$

$$
\qquad R^2 = .71
$$

$$
\qquad \text{s.e.} = .86
$$

The coefficient on the change in profits is larger in the group B regression than in the group II one, but is still insignificant. Lagged profits, having little correlation ($R^2 = .05$) with the unemployment term, appear significantly. Trying a spillover form for group B gave a better

fit:[7]

(5a) $$W_B^* = -1.2828 + .3567W_A^* + .3515(P_{-1})_B$$
$$(.0680) \quad (.0540)$$

$$R^2 = .52$$
$$\text{s.e.} = .75$$

It should be noted that largely because of the method of construction of the variables, all of the equations had positively autocorrelated residuals. This implies that the standard errors associated with the coefficient estimates are smaller than the true standard errors and thus that a more stringent test of significance than the usual rough test of a coefficient against twice its standard error is appropriate. The coefficients whose significance then becomes suspect are notably those on $C_{-1}^*$ and $\Delta P$ in the group B regression (5).

*Implications*

Both the sizes of various coefficients and the ones which are significant differ in the above regressions. Of particular interest is the difference in coefficients on $C_{-1}^*$, implying that greater union strength is significantly associated with greater adaptation of wage changes to cost-of-living changes. This affects the stability of a given wage change-unemployment combination by introducing into the wage mechanism a dependence on the previous wage change relative to productivity change. It is comforting, however, that the coefficient on $C_{-1}^*$ is never larger than one, which would indicate explosive behavior. The best equation for group I, (2a), indicates that about 33 per cent adjustment occurs. The $C_{-1}^*$ coefficient is insignificant in the group II regressions. Regression (4a) for group A indicates about 45 per cent adjustment, while in the group B regressions the $C_{-1}^*$ coefficient (.22) is not quite twice its standard error and thus likely insignificant, although larger than the definitely insignificant coefficient in the group II regression (.07). The divergence of the coefficients on $C_{-1}^*$ is roughly the same between groups I and II (.27) as between groups A and B (.24).

Profits, either in lagged rate or the change-in-profit-rates form, are generally viewed as a determinant of wage changes because they reflect product market or industry conditions: the ability of firms to grant higher wages and/or their willingness to do so rather than undergo a strike. We might expect that, for a given profit rate, stronger unions would tend to have the larger wage gains. On the other hand, stronger

[7] Regressing $W_A^*$ on $W_B^*$ and lagged group $A$ profits yielded an $R^2$ of .26, leading to a rejection of the hypothesis that causation may be running contrary to that indicated in equation (5a).

unions may be consistently able to get higher wage increases rather independently of market conditions while wage gains in the weaker union groups are more sensitive to them. In any event, we have noted the multicollinearity problem which makes it impossible to get comparable coefficients on the lagged-profits-rate term. In addition, if we look at the squared simple correlation coefficients between wage changes and lagged profits by group, the evidence is mixed. While percentage wage changes and lagged profits are more highly correlated for group I than for group II (.24 compared to .11), the group B correlation is higher than that for group A (.26 compared to .17). The change-in-profits term has no collinearity problems and it appears in the regressions for both groups A and B. The larger coefficient on $\Delta P$ in regression (4) or (4a) compared to that in (5) indicates that strong unions will get larger wage increases for given increases in the profits rate, and for equal percentage changes in the profits rate the strong union advantage is even greater; for decreases in the profit rate this sensitivity is of course a disadvantage.

The lower coefficients on $S$ in the weaker union groups are as expected because the effect of the guideposts should be to constrain wage changes to 3.2 per cent; since groups II and B have averaged lower wage changes than groups I and A, respectively, less of a reduction is necessary to meet the constraint. Another possible explanation is that guidepost pressure is proportional to prominence in the public eye, which is associated with strongly unionized industries.[8]

The overall implications of these equations can be used to measure the effect of union strength on the terms of the tradeoff between unemployment and price stability. As this requires going from percentage wage changes to percentage price changes, it is necessary either to assume some sort of pricing mechanism or to determine one empirically. Since the focus of this paper is on finding differences in wage or price changes due to differences in union strength, we will use the simple pricing rule that the increase in prices equals the excess of the wage increase over the increase in productivity.[9] The rule is neutral in the sense of describing price changes for which wage and profit shares will remain the same and it has the additional advantage of "holding constant" the effect of pricing policies which may differ by industry, permitting the independent effect of union strength to be isolated.

[8] In a paper published after this study was completed, Perry reports the same uneven impact of the guideposts. He analyzed the wage behavior in sixteen two-digit manufacturing industries classified into two groups according to whether wage settlements tend to be "visible" or "invisible," and found that the wage changes in the visible group were apparently much more susceptible to guidepost pressure. It is worth noting that Perry's "visible" group of nine industries includes (of the industries common to both studies) seven of the industries in our strong union group I, and his "invisible" group of seven industries includes five of the industries in our weak union group II. See [6].

[9] This follows the lead of Perry [5, p. 291].

Table 2 below shows the steady-state wage and price changes implied by the equations for each group at a 4 per cent level of unemployment, assuming productivity growth of 3 per cent annually and the change in profits equal to zero. To approximate the profit rates likely at such a time, the actual values in 1966(II) when the economy was at a roughly 4 per cent level, were used. Wage and price changes are estimated both "without guideposts" (i.e., $S=0$), and "with guideposts" $(S=1)$. Price changes are calculated as though each group were the only group.[10,11]

As might be expected, the strong union group (comparing I to II and

TABLE 2—WAGE AND PRICE CHANGES AT FOUR PER CENT UNEMPLOYMENT

| Group | Equation | Profits Rate | Without Guideposts | | With Guideposts | |
|-------|----------|--------------|--------------------|--------------------|--------------------|--------------------|
| | | | Per Cent $\Delta W$ | Per Cent $\Delta$ Prices | Per Cent $\Delta W$ | Per Cent $\Delta$ Prices |
| I | 2a | — | 5.02 | 2.02 | 2.92 | −.08 |
| II | 3a | 14.2 | 4.88 | 1.88 | 4.12 | 1.12 |
| | 3b | 14.2 | 4.94 | | 3.80 | |
| A | 4a | — | 5.65 | 2.65 | 2.09 | −.91 |
| B | 5 | 13.1 | 5.06 | 2.06 | 4.05 | 1.05 |
| | 5a | 13.1 | 5.33 | | 4.07 | |

A to B) has the largest wage increase in the "without guideposts" case. The difference is not particularly great however. On the basis of the regular, i.e., non-spillover, equations, the wage change of the weak union group II is 97 per cent as large as that of group I, and the wage change of group B is 90 per cent as large as that of group A. The "with guideposts" results indicate that the impact of the guideposts is principally on the sectors with strong unions, with the surprising result that wage changes in those industries are less than those of the less strongly unionized. It should be noted, however, that this is not contrary to fact: since approximately mid-1963 the actual percentage wage changes in the weak union sectors have been consistently higher than those in the strong union sectors, a relationship exactly opposite to that existing in the prior period.

The results seem consistent with the conclusions of several studies

[10] Price changes are not given for the spillover equations because of the inappropriateness of assuming the group is the only group.

[11] To illustrate the calculation procedure, the estimated wage change for equation (2a) is as follows:

$$W^*_I = .0921 + .3336(W^*_I - 3) + \frac{17.0042}{4} - 1.3937(S) = 5.02 \text{ for } S = 0,$$

$$\text{or} \quad 2.92 \text{ for } S = 1.$$

that differences in union strength make little difference in relative changes in wages during periods of low unemployment. [1] [4]. The question that then arises is the effect of union strength in periods of considerable unemployment. Can union strength force a larger change in wages under such conditions?

To analyze this, the unemployment rate was taken to be 5 per cent (the average over 1953–66 was approximately 4–3/4 per cent), and profits where significant were taken at their 1953–66 averages. Productivity growth was assumed as before at 3 per cent and the change in profits at zero. The resulting wage changes are given in Table 3.

The differences in wage changes are now much greater. As before, the stronger union groups are associated with the larger increases and the

TABLE 3—WAGE CHANGES AT FIVE PER CENT UNEMPLOYMENT

| Group | Equation | Profit Rate | Per Cent $\Delta W$ | |
|-------|----------|-------------|---------------------|------------------|
| | | | Without Guideposts | With Guideposts |
| I | 2a | — | 3.74 | 1.64 |
| II | 3a | 10.3 | 3.16 | 2.40 |
| | 3b | 10.3 | 3.02 | 1.88 |
| A | 4a | — | 4.20 | .64 |
| B | 5 | 7.6 | 2.50 | 1.49 |
| | 5a | 7.6 | 2.88 | 1.62 |

weaker groups with the smaller, but the wage change of the weak union group II is now 84 per cent as large as that of group I, compared to 97 per cent at 4 per cent unemployment, and the wage change of group B is only 60 per cent as large as that of group A, compared to 90 per cent at 4 per cent unemployment.[12]

Another interesting difference in the results at 4 per cent and 5 per cent unemployment shows up; the wage changes implied by the spillover equations (3b and 5a) are about halfway between those given by

[12] Since profits have a definite cyclical behavior, it must be asked if any of our results are due to the presence of lagged profits in only the weak union groups. To check this, the equations in which lagged profits appear (although insignificantly) for the strong union groups were used for the "without guideposts" predictions at 4 per cent and 5 per cent unemployment; for group I, equation (2) yielded a wage increase of 5.05 per cent at 4 per cent unemployment, assuming lagged profits equal to the actual 1966(II) value of 13 per cent, and 3.73 per cent at 5 per cent unemployment, lagged profits equal to 10.7 per cent, the 1953–66 average. These are practically identical to the results of equation (2a) as the correlation between lagged profits and unemployment alters the coefficient on the latter when lagged profits are omitted. For group A, equation (4) yielded wage changes of 6.40 per cent and 4.87 per cent, assuming profits rates of 13.2 per cent and 11.6 per cent and 5 per cent unemployment levels. Both of these are higher than the results from equation (4a) but accentuate our conclusions rather than otherwise.

the regular equations in the 4 per cent unemployment period; but at 5 per cent unemployment, the spillover wage changes are much closer to those given by the non-spillover equations (3a) and (5). The spillover effect is apparently greatest in times of tight markets; at 5 per cent unemployment it is negligible. In the "with guideposts" case, 3 out of 4 times the spillover wage change is closer to the regular wage change, which is probably attributable to the uneven impact of the guideposts note above, permitting the weaker union group to have the larger wage increase at any given level of unemployment.

To conclude, it appears that union strength does make a difference: it significantly worsens the terms of the tradeoff between unemployment and inflation. At 5 per cent unemployment the wage-change advantage to strong unionism is in the range of .6 to 1.7 percentage points, indicating a rate of inflation of, say, 1 per cent when prices would otherwise be stable. How much worsening exists at 4 per cent unemployment is hard to determine because the market spreads the wage increases of strong unions into the weaker union sectors so that the wage increase justified by pure market forces cannot be estimated. One would guess, however, that the worsening in the tradeoff terms is greater than at 5 per cent unemployment. The presence of the guideposts apparently eliminates the influence of union strength. Overall, the guideposts cut wage increases by about 1 percentage point but their impact varies, being greatest in the sectors with the stronger unions.

## APPENDIX

$U$     Seasonally adjusted unemployment rate as a percent of the civilian labor force. Source: *Surv. Curr. Bus.*

$C^*$   $$\frac{C-C_{-1}}{C_{-1}}+\frac{C_{-1}-C_{-2}}{C_{-2}}+\frac{C_{-2}-C_{-3}}{C_{-3}}+\frac{C_{-3}-C_{-4}}{C_{-4}}, \text{ where the } C \text{ variables are}$$

quarterly Consumers' Price Index numbers, 1957–59 = 100. Source: *Surv. Curr. Bus.*

$P$     Net profits after taxes as a percent of stockholders equity, calculated as a moving annual average rate: $P = 1/4(P_0 + P_{-1} + P_{-2} + P_{-3})$. For the subgroups, profits after taxes and stockholders equity were summed over the industries in the group, then the ratio was calculated. Changes in the sampling procedure occurred twice in the period and necessitated splicing the raw data series; this was done by assuming the most recent sample was correct and the error a linear function of time. Source: *Quarterly Financial Reports of U.S. Manufacturing Corporations*, F.T.C.-S.E.C.

$W^*$   $$\frac{W-W_{-1}}{W_{-1}}+\frac{W_{-1}-W_{-2}}{W_{-2}}+\frac{W_{-2}-W_{-3}}{W_{-3}}+\frac{W_{-3}-W_{-4}}{W_{-4}}, \text{ where } W \text{ is straight}$$

time average hourly earnings of production workers in manufacturing. Source: *Employment and Earnings Statistics for the United States, 1909–64*, and *Mo. Lab. Rev.* For the period 1956, average straight time hourly earnings were calculated by applying the B.L.S. adjustment factor to average gross hourly earnings. The adjustment factor described in the *Mo. Lab. Rev.*, May 1950, *73*, 537–40. To obtain straight time average hourly earnings for each of the four groups, average straight time hourly earnings on an industry basis were weighted by employment in the industry, the weights calculated as the average employment at the beginning, mid-, and near-end points of the period: 1953(I), 1958(IV), and 1965(IV). The weights were:

|  | Group | | | |
|---|---|---|---|---|
|  | I | II | A | B |
| Petroleum Refining & Allied Industries | .017 |  | .050 |  |
| Primary Metals | .130 |  | .372 |  |
| Transportation Equipment | .164 |  | .468 |  |
| Rubber & Misc. Plastics | .039 |  | .110 |  |
| Paper & Allied Products | .057 |  | ——— |  |
| Stone, Clay & Glass | .060 |  | 1.000 |  |
| Fabricated Metals | .115 |  |  |  |
| Machinery except Electrical | .138 |  |  |  |
| Electrical Equipment & Supplies | .129 |  |  |  |
| Food & Kindred Products | .151 |  |  |  |
|  | 1.000 |  |  |  |
| Tobacco Manufacturing |  | .018 |  |  |
| Apparel & Related Products |  | .237 |  |  |
| Printing, Publishing & Allied Industries |  | .120 |  |  |
| Chemical & Allied Products |  | .108 |  |  |
| Lumber & Wood, except Furniture |  | .128 |  | .248 |
| Furniture & Fixtures |  | .076 |  | .148 |
| Instruments & Related Products |  | .050 |  | .096 |
| Textile Mill Products |  | .193 |  | .373 |
| Leather & Leather Products |  | .070 |  | .135 |
|  |  | 1.000 |  | 1.000 |

*S*    A dummy variable with value zero from 1953(I) through 1961(IV), and value one thereafter.

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# COMMUNICATIONS

## Consumption, Durable Goods Spending, and Changing
## OASDHI Seasonality

The permanent-income hypothesis predicts that consumers attempt to even out their consumption stream over long periods of time. Doubt is cast on this theory if consumption responds sharply to unexpected changes in income. Unexpected or "transitory" income is predicted to affect mainly spending on household durables.[1]

The most prominent tests of the permanent-income hypothesis thus far conducted have measured effects of restitutions [16], National Service Life-Insurance dividends [2] [3] [4], and military bonuses [19] on consumption and durable goods spending. Unfortunately the test results remain in conflict despite attempted reconciliations [5] [6] [17] [18]. Although other studies have also attacked the problem [8] [9] [11] [22], there is need for additional evidence as to how different types of transitory income may affect spending for nondurables and services (consumption) and consumer durable goods expenditures (i.e., household investment) [10].

The main transitory income phenomena examined in this paper are several positive and negative changes in disposable income which were caused by unusual movements in the seasonal pattern of employee Old Age, Survivors, Disability and Health Insurance (OASDHI) withholding.[2] Specifically, the question is whether capricious changes in the OASDHI seasonal pattern have affected the seasonal pattern of durable goods spending significantly more than they have the seasonal pattern of current consumption. For example, has unexpectedly early termination of OASDHI withholding stimulated the purchases of, say, household furnishings significantly more than the purchase of commodities like cosmetics or foods? Generally affirmative answers

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[1] In Milton Friedman's words:

. . . any transitory changes in income lead primarily to additions to assets or to the use of previously accumulated balances rather than to corresponding changes in consumption.

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Is not the windfall likely to be used for the purchase of durable goods? Or, to put it differently, is not the timing of the replacement of durable goods and of additions to the stock of such goods likely to some extent to be adjusted so as to coincide with windfalls? [13, p. 28].

Friedman has since drawn a sharper conceptual distinction between windfalls and transitory income, but apparently he has not deviated from the postulate that the correlation between transitory components of income and consumption is zero [15] [14].

[2] Friedman notes that "the precise line to be drawn between permanent and transitory components is best left to be determined by the data themselves, to be whatever seems to correspond to consumer behavior." [13, p. 23].

Although health insurance provisions were not added until 1965, the terminology, "OASDHI," is used throughout this paper.

to these questions will provide modest support for a loose permanent-income hypothesis.[3]

Instead of a single bonus or a single restitution that supplements expected income, the transitory income studied here consists of numerous subtle disruptions of disposable income caused by changes in OASDHI withholding during the period 1952-1964. The disruptions came from two basic causes: (1) Three increases in the taxable OASDHI base tended to increase the duration of withholding for many workers and hence produced negative transitory income changes for any taxpayers who did not realize that the duration of withholding would be extended; and (2) positive transitory income changes resulted, between the base increases, when increases in wages caused many taxpayers to complete payments *for the first time or to complete them earlier* than previously had been experienced.[4] The change in disposable income produced automatically by wage level increases probably also was unexpected by many taxpayers and thus took on the characteristic of positive transitory income.[5]

Unusual changes in the seasonal pattern of OASDHI contributions produced by the forces named above have uniquely produced both negative and positive transitory income. Analysis of effects of these income changes can

[3] This comment is a spinoff from the author's study of *Some Economic Effects of Seasonality in OASDHI Tax Payments,* a research report prepared for the Office of Research and Statistics of the Social Security Administration. Efforts to trace some of the effects of an unneutral tax collection procedure produced an independent body of evidence which now seems best explained in terms of the transitory income component of the permanent-income hypothesis.

[4] A taxable limit not only has been the dominant cause of seasonality in employee OASDHI tax withholding, but when fixed for over a year the limit also has caused individual and aggregate seasonal patterns automatically to change in response to wage level changes. The original OASDHI taxable limit was $3,000. This limit was raised to $3,600, $4,200, $4,800, and $6,600 in 1951, 1955, 1959, and 1966 respectively, but wage levels were' rising at a faster rate. Consequently, the 93 per cent of total covered earnings which were' taxed under the 1938 limit of $3,000 had fallen to about 73 per cent in 1964. Over the same period the percentage of workers exceeding the annual earnings limit rose from about 3 per cent to over 33 per cent. Whereas only about 6 per cent of male four-quarter civilian wage and salary workers exceeded the taxable limit in 1938, about 62 per cent exceeded the $4,800 limit in 1964 [20] [21].

The current taxable ceiling of the OASDHI tax is the first $6,600 of wages or salaries in covered employment. Of course, the greater one's paychecks and the more often one is paid, the faster the ceiling is reached and withholding ceases. For example, one earning $1,100 per month in 1966 had $46.20 more per month of disposable income in each of the last six months than in each of the first six. If the same taxpayer's earnings increased to $1,320 per month in 1967 he would have completed OASDHI payments in five months instead of six. This example indicates the manner in which wage-level growth tended to produce positive transitory income in every year in which the taxable limit was not raised.

[5] Possibly indicative of the lack of knowledge of wage earners about changes in withholding are: First, there has been little notice of OASDHI seasonality, much less its changes, even by professional economists; secondly, where seasonality (or its companion regressivity) has been recognized, its basic cause (the taxable limit) has not been clearly recognized [1] [7]. The extent to which consumers might discount changes in disposable income resulting from changing OASDHI seasonality may also be judged by the fact that the Bureau of Labor Statistics has avoided the problem of calculating the effect of OASDHI seasonality on "spendable income" even though it is aware of the influence of the ceiling on disposable income [23].

throw further light on the permanent-income theory. The test will be whether *changes* in the seasonal pattern of employee OASDHI tax withholdings are inversely associated with *changes* in the seasonal pattern of spending on durable goods to a significantly greater extent than with *changes* in the seasonal patterns of spending on nondurables and services.

The basic data used in testing the responsiveness of seasonal expenditures for consumption and durable goods to changes in aggregate employee OAS-DHI withholdings are implicit quarterly absolute seasonal adjustment values, i.e., the differences between unadjusted values and seasonally adjusted values. However, these data for the years 1952 to 1964 require two adjustments to hold other factors constant. First, the data require deflation and then a special regression technique is needed.

The seasonal adjustment values for each of the variables are deflated for price, population, and GNP growth to rid them of variation (accentuation) attributable to such expected secular changes.[6] This deflation operation, entailing the normal risk that spurious effects may be introduced, is undertaken to estimate changes in the seasonal patterns of consumption and durable goods variables primarily attributable to endogenous variations in employee OASDHI seasonality $(E_s)$. Such changes in $E_s$, over the period, have resulted from program changes and from the tendency of growth in even real wages to outpace increases in the taxable ceiling.

The deflated seasonal patterns for $E_s$ and for one type of spending during the period from 1952 to 1964 can be seen in Figure 1. The scatter diagram is merely suggestive, of course, but the plot of deflated dollar absolute seasonal adjustment values for total durable goods expenditures $(D_s)$ against the deflated dollar absolute seasonal adjustment values for employee OASDHI payments, $E_s$, indicates that *movements* in the two patterns have been inversely associated in the fourth quarter, the period in which positive transitory income tended to occur from 1952 to 1964. Second, the accentuation of second-quarter employee OASDHI payments, which produced negative transitory income in this quarter over the period, apparently adversely affected expenditures on durable goods to a lesser extent.[7]

But Figure 1 tells no more than simple regression analysis; indeed, it could be misleading if it draws attention to the overall association between the four-quarter patterns and away from the association between changes in the patterns, i.e., the changes in values for each quarter.[8] A multiple regression technique

[6] An alternative to the deflation procedure might have been the introduction of the seasonally adjusted level of real per capita GNP as another independent variable in the equations. In this manner, the explicit effects of a relatively more "permanent" income component could have been introduced into the analysis. On the other hand, introduction of this additional independent variable would have increased the risk of multicollinearity problems.

[7] Data are not yet available [20] [21] to indicate whether the large increase in the taxable limit in 1966, with the resulting change in $E_s$ seasonality, affected seasonality in spending for durable goods.

[8] Of course, custom and climate play a role in changing seasonality because they are the basis for wants and willingness to spend, but they are necessary rather than sufficient conditions. A seasonal decline in OASDHI payments tends to help make effective some previously dormant fourth-quarter wants and willingness to spend.
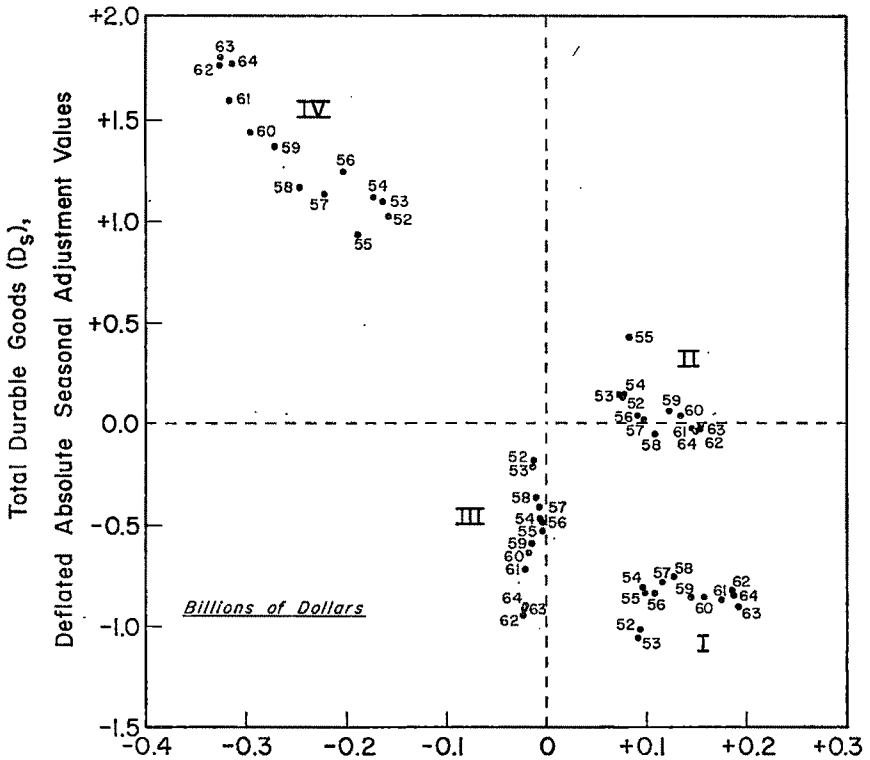
FIGURE 1

must be designed to measure associated changes alone if the effects of such transitory income are to be estimated.

It is possible to estimate the effects produced primarily by changing OASDHI seasonality, i.e., transitory income, with the use of dummy variables. In effect, dummy variables make it possible to measure and then cumulate association between the seasonal values for one quarter at a time with other quarters held constant. When the variables for, say, the fourth quarter are correlated, only *associated changes* in fourth-quarter seasonality are measured. This approach further serves to avoid the bias that there must always be at least one quarter which is seasonally high or low.[9]

Other explanatory variables also are specified in the multiple regression equations mainly to hold constant changes in the seasonal patterns of other sources of household funds. The additional variables in the regressions explaining consumption and durable goods spending, besides the dummy variables $Q1$, $Q2$, and $Q3$, are the deflated seasonal (adjustment) values for the

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[9] Regressions based on the total seasonal patterns, i.e., without dummy variables, would produce a high degree of correlation between $E_s$ and $D_s$ even if the seasonal values in the peak and trough quarters were inversely associated simply because of chance.

personal income tax ($YT_s$), installment credit ($IC_s$), noninstallment credit ($NIC_s$) and current receipts before OASDHI withholding ($CR_s$).

In evaluating Table 1, one might interpret all three of the variables, $E_s$, $YT_s$, and $CR_s$ as "transitory income" variables, as they are all implicit seasonal values, deflated for changing price levels, for population, and for GNP growth. If changes in the seasonal patterns of each of these variables were largely unexpected, i.e., transitory, the first two variables should have significant negative coefficients and the third should have a significant positive correlation. The results are as follows: first, two of the three variables have a significant influence on durable goods seasonality; second, none of the three variables has a significant influence on nondurable goods expenditures; and finally, two of the three variables have a significant influence on service expenditures (although the estimated MPC's are fairly low). Possible distortions due to the seasonal adjustment and deflation techniques aside, these results generally support a loose permanent-income hypothesis.

But, whether $YT_s$ and $CR_s$ truly are transitory income variables is questionable. Changes in $CR_s$ tended to result from changes in the seasonal pattern of payrolls, and thus might have been less unexpected than were changes in employee OASDHI seasonality. Movements in $YT_s$, to some extent also functions of payroll changes, probably were caused mostly by underwithholding from taxpayers with high wages and to tax payment behavior of persons earning nonwage income. Before the Tax Adjustment Act of 1966 reformed withholding and income tax installment payment procedures, these taxpayers tended to underpay quarterly installments and to incur increasingly large liabilities at the final filing date. For many taxpayers these developments may have been expected, and thus the transitory nature of this change is doubtful. Hence, it may be more appropriate to interpret and emphasize only the regression results with respect to $E_s$.

With $D_s$ symbolizing durable goods seasonality, $ND_s$ nondurables, and $S_s$ services, measures of the association and importance of $E_s$ in explaining *changes* in the seasonal spending patterns are as follows: First, one dollar of change in $E_s$ tends to be inversely associated with \$2.36 of change in $D_s$, and this association is statistically significant at the .001 level. Secondly, the partial correlation coefficient ($r$) is $-.67$. Thus, the coefficient of determination ($r^2$) is .45 and $E_s$ explains in the neighborhood of 45 per cent of otherwise unexplained changes in $D_s$. Only $IC_s$ is of greater importance in explaining changes in the seasonal pattern of durable goods spending. On the other hand, the regression coefficients of $ND_s$ and $S_s$ against $E_s$ are not statistically significant, and the respective partial correlation coefficients are only .15 and $-.20$.[10]

[10] Since the transitory income components examined in this study are relatively small from the standpoint of individuals (but not in the aggregate) these findings would seem to be at odds with Landsberger's attempted reconciliation [18] of the Bodkin-Kreinin controversy. Landsberger suggested that the MPC out of transitory income may decrease sharply as "windfall" income rises and that this might explain the contradictory findings. Yet, the transitory income which was found here to have little or no association with consumption changes was relatively small in amount for individuals.

TABLE 1—MULTIPLE REGRESSION EQUATIONS FOR DEFLATED DOLLAR SEASONAL ADJUSTMENT VALUES OF DURABLE GOODS ($D_s$), NONDURABLE GOODS ($ND_s$), AND SERVICE EXPENDITURES ($S_s$), 1952–1964[a]

| | $E_s$ | $YT_s$ | $IC_s$ | $NIC_s$ | $CR_s$ | Q1 | Q2 | Q3 |
|---|---|---|---|---|---|---|---|---|
| $D_s = \$144.87$ | $-2.36E_s$ | $-0.06YT_s$ | $+2.49IC_s$ | $-0.04NIC_s$ | $-0.14CR_s$ | $+1147Q1$ | $-708Q2$ | $-1018Q3$ |
| Standard error | (0.40) | (0.01) | (0.29) | (0.05) | (0.09) | (494) | (239) | (188) |
| Computed $t$ value | $-5.92$ | $-3.94$ | 8.67 | $-0.95$ | $-1.53$ | 2.32 | $-2.97$ | $-5.41$ |
| Partial coefficient ($r$) | $-.67$ | $-.52$ | .80 | $-.14$ | $-.23$ | .33 | $-.41$ | $-.64$ |
| $ND_s = \$3,611$ | $+0.59E_s$ | $-0.03YT_s$ | $+0.69IC_s$ | $+0.06NIC_s$ | $-0.05CR_s$ | $-5399Q1$ | $-4585Q2$ | $-4515Q3$ |
| Standard error | (0.59) | (0.02) | (0.42) | (0.07) | (0.13) | (729) | (352) | (277) |
| Computed $t$ value | 1.01 | $-1.46$ | 1.63 | 0.84 | $-0.34$ | $-7.41$ | $-13.04$ | $-16.28$ |
| Partial coefficient ($r$) | .15 | $-.22$ | .24 | .13 | $-.05$ | $-.75$ | $-.89$ | $-.93$ |
| $S_s = \$-515$ | $-0.35E_s$ | $-0.04YT_s$ | $-0.25IC_s$ | $+0.03NIC_s$ | $+0.17CR_s$ | $+851Q1$ | $+765Q2$ | $+434Q3$ |
| Standard error | (0.25) | (0.01) | (0.18) | (0.03) | (0.06) | (315) | (152) | (120) |
| Computed $t$ value | $-1.37$ | $-4.31$ | $-1.35$ | 0.98 | 2.93 | 2.70 | 5.03 | 3.62 |
| Partial coefficient ($r$) | $-.20$ | $-.55$ | $-.20$ | .15 | .41 | .38 | .61 | .48 |

[a] Other symbols are: $E_s$, Employee OASDHI Payments; $YT_s$, Personal Income Tax Payments; $IC_s$, Installment Credit; $NIC_s$, Noninstallment Credit; and $CR_s$, Current Receipts (before OASDHI). Dummy variables Q1, Q2, and Q3, hold constant the average levels of seasonality in the quarters. Coefficients of multiple determination for $D_s$, $ND_s$, and $S_s$ are .996, .999, .998 respectively. These high values suggest that the dummy variables tend to proxy for other variables not specifically in the equations.

Thus the seasonal pattern for durable goods expenditures was quite responsive to changes in the seasonal pattern of employee OASDHI payments, while seasonal patterns for consumption and service expenditures were much less sensitive to this type of transitory income. These findings with respect to $E_s$ appear consistent with a loose permanent-income hypothesis.[11]

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## APPENDIX A

There apparently has been no consideration of seasonal fluctuations in spending and consumption in recent literature on theories of consumer behavior [12]. Such attention seems desirable for two reasons: first, seasonal fluctuations are quite substantial and thus they should be investigated as macroeconomic phenomena.

CURRENT DOLLAR ABSOLUTE SEASONAL ADJUSTMENT VALUES, 1965

(billions)

|  | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| Personal Consumption Expenditures | $-23.3 | $-4.8 | $-11.4 | $39.6 |
| Durables | -6.7 | .4 | -5.5 | 12.0 |
| Nondurables | -18.1 | -5.4 | -5.8 | 29.0 |
| Services | 1.5 | .2 | -.5 | -1.4 |

*Source:* U. S. Department of Commerce, *The National Income and Product Accounts of the United States, 1929-1965,* Washington 1966, pp. 41, 43.

Secondly, seasonality in household spending is an aspect of consumer behavior important to the firm, a fact not lost on most retailers.

The task of integrating consumer seasonal activity into the consumer behavior theory spectrum does not appear forbidding. Individuals may level their consumption streams over a long period of time by spending more or less during a year than their current incomes would support. But, annual spending determined in the light of permanent-income expectations could still be uneven among the seasons. The consumer (and the economist) need not totally sacrifice awareness of close terrain to gain perception of the "horizon." Hence, seasonality in consumption seems compatible with a life-cycle theory of consumption behavior. Furthermore, movements or changes in the seasonal patterns of consumer expenditures may be of some relevance in evaluating more general theories of consumer behavior, among them the permanent-income hypothesis.

[11] Other implications for consumer behavior theory are suggested in Appendix A.

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# Chicago Economists, Deficit Budgets, and the Early 1930s

"There is clearly great similarity between the views expressed by [Henry C.] Simons and by [John Maynard] Keynes—as to the causes of the Great Depression, the impotence of monetary policy, and the need to rely extensively on fiscal policy" [2, p. 7]. Coming from an authority no less than Professor Milton Friedman, this statement undoubtedly surprised economists who are unaccustomed to hearing Simons and Keynes mentioned in the same breath. The more familiar impression of the views of these two giants was struck five years before Friedman's remarks: in a much-celebrated controversy [9, 5, 1], Professor Lawrence Miller charged that a School of economics crystallized at the University of Chicago during the tenure of Professors Knight, Simons, and Viner and that this School was "consistently less enamored with Keynesian ideas and terminology than the rest of the profession" [5, p. 68]. This apparent conflict is heightened by Friedman's lengthy comparison of the Keynes and Simons interpretations of 1929-33: they both argued that it is collapse of confidence which sets off a demand for liquidity, that this demand cannot be met but the attempts to meet it force liquidation, and that this liquidation includes bank loans with a resultant decline in the quantity of money [2, p. 6]. In short, Friedman argues that both Simons and Keynes emphasized the state of business expectations and the desire for liquidity. Accordingly, Simons and Keynes each turned to fiscal policy—changes in government expenditures and taxes—as their primary tool for promoting economic stability [2, p. 9]. Friedman suggests that the views which Keynes and Simons held in common were also widely shared by Simons' contemporaries [2, p. 4], thereby making Chicago students "much less susceptible to the Keynesian virus than their contemporaries in London, England, and Cambridge, Massachusetts, who were taught that the Great Depression was a necessary and ultimately healthy purgative" [2, pp. 8-9].

Friedman's appraisal of his predecessors surprises many observers because they have become accustomed to associating Chicago economists with the advocacy of limited government and the distrust of discretionary authority in government [5, p. 65]. While these themes might indeed characterize much of their work, they should not be allowed to obscure the facts that Frank H. Knight, Henry C. Simons, Jacob Viner, and their Chicago colleagues argued throughout the early 1930s for the use of large and continuous deficit budgets to combat the mass unemployment and deflation of the times, that they

played an important role in the development of the notion of compensatory public spending, and that they attempted to persuade the Hoover Administration to adopt large budgetary deficits. Strangely enough, these contributions have gone largely uncredited.

While Knight, Viner, and others are understandably amused, if not annoyed, at charges that a School of economics was founded during their tenure, they surely do not deny that there was a remarkable consensus in support of fiscal policy rather than either monetary or wage policy during the early years of the Great Depression.[1] Accordingly, this paper is devoted to a study of this group's professional activities during the pre-Keynesian years 1931-33.

*Jacob Viner (1931)*

By 1931, the simple truths of compensatory public finance, i.e., that governments should execute budgetary deficits in depression periods and budgetary surpluses in boom periods, had already caught root in the United States. During that year, Jacob Viner was invited to lecture on "Problems of International Commercial and Financial Policy" at the Institute of Politics at Williamstown, Massachusetts. At the seventh meeting of his Round Table, Viner discussed and criticized prevailing American Treasury policy. Viner explained that the Treasury was still practicing traditional policies based on so-called sound principles of finance: taxing heavily, spending lightly, and redeeming debts. Although such policies were sound during periods of prosperity, Viner argued, they were unwise and inappropriate depression policies. Viner advised a precisely opposite depression policy: taxing lightly, spending heavily, and borrowing [7, p. 182]. During depression periods, government may borrow to defray expenditures which give rise to the employment of otherwise idle capital and labor. And inasmuch as the capital and labor would otherwise remain idle, Viner pointed out that "the public works or other useful services so financed during a period of economic depression are from the national economic point of view almost costless" [7, p. 183].

Viner's discussion at Williamstown was one of the first important statements of the "simple truth" of a compensatory role for government spending in this country. Viner was not speaking in isolation, however. According to him, "the idea [that government should utilize deficits in depressions and surpluses in booms] was then [1931] commonplace in my academic surroundings of the time, and I cannot recall that any of my Chicago colleagues would have dissented" [13, p. 264]. This relative unanimity was much in evidence a few months later when the Chicago economists issued an important memoran-

[1] This should not be interpreted as a suggestion that Chicago economists represented a monolithic point of view. For example, it has been pointed out that Paul Douglas and Harry Millis diverged from the consensus on the role of wage policy in recovery and that Jacob Viner and Simeon Leland were more willing then Frank Knight and Henry Simons to abandon "rules versus authorities" for the practical benefits of rapid recovery from the Depression. While supporting the thesis that the Chicago economists failed to be highly monolithic, these differences were not serious in the face of the remarkable policy consensus which characterized the group. Notably, even Knight and Simons proved willing to "weasel" on "rules versus authorities" when they signed the January 1932 telegram to President Hoover.

dum to Congressman Samuel B. Pettengill (Indiana) on the advisability of either borrowing or printing money as a depression remedy.

## 1932 Chicago Memorandum

In their April 26, 1932 memorandum to Congressman Pettengill, the twelve Chicago economists[2]—including Knight, Simons, Viner—argued strongly in favor of "fiscal inflation" as the means of checking depression and initiating recovery [10, pp. 524-27]. These economists were quick to dismiss recovery by automatic adjustments. Reliance on the automatic process involved "tremendous losses, in wastage of productive capacity, and in acute suffering" [10, p. 524]. They further pointed out that wage and price rigidities were largely the ground on which governmental action was justified. Their advice, therefore, was that recovery could be brought about by injecting enough new purchasing power which, while amenable to abuse, required only courageous fiscal policy on the part of the federal government. To the Chicago economists, action was needed to raise prices, and this action "should take the form of generous Federal expenditures, financed without resort to taxes on commodities or transactions" [10, p. 525].

One of the fears expressed by the Chicago economists was that in the event that their advice was followed, the "fiscal inflation" would be of token proportions. They warned of the danger of emergency-spending schemes whose "inadequate, temporary stimulation might well leave conditions worse than it found them" [10, p. 525]. Convinced that too meager or too short-lived "fiscal inflation" would induce at best only temporary revival and then serious relapse, the Chicago economists' recommendation was that heavy doses of stimulant should be administered, that they should continue until recovery was firmly established, and that only then should these expenditures be discontinued.

The Chicago economists realized that their recommendation would be received with alarm by some. Accordingly, they appended two arguments. First, they agreed that it was probably best, under the circumstances,[3] for the government to sell new issues of bonds directly to the reserve banks or, in effect, to exchange them for bank deposits and Federal Reserve notes: "much may be said, indeed, for issuing the bonds with the circulation privilege, thus permitting the reserve banks to issue Federal reserve bank notes in exchange; for this procedure does not much invite suspicion, has supporting precedent, and would greatly reduce the legal requirements with respect to gold" [10, p. 526]. Also, they pointed out that "fiscal inflation" was the most promising means of eventually restoring an annually balanced budget and that in the meanwhile Congress should intend to balance the budget over periods of five years or so.

[2] Signers of the memorandum were Professors Garfield V. Cox, Aaron Director, Paul H. Douglas, Harry D. Gideonse, Frank H. Knight, Harry A. Millis, Lloyd W. Mints, Henry Schultz, Henry C. Simons, Jacob Viner, Chester W. Wright, and Theodore O. Yntema.

[3] Some feared that drastic inflation threatened gold. The Chicago economists argued that their policy must be carried through, whatever that policy meant for gold.

*Frank H. Knight (1932)*

On April 20, 1932, Senator Robert F. Wagner decided to sample professional opinion of deficit budgets and addressed letters of inquiry to the foremost economists in the United States. On May 8, 1932, Frank H. Knight replied to Senator Wagner in favor of such tactics: "As far as I know, economists are completely agreed that the Government should spend as much and tax as little as possible, at a time such as this—using the expenditure in the ways to do the most good in itself and also to point toward relieving the depression . . ." [11, p. 10323].

*Simeon E. Leland (1932)*

Part of the widespread outspokenness which the Chicago economists levied against official budgeting philosophy was Professor Simeon E. Leland's lectures on the subject. In October, 1932, Leland addressed the International City Managers' Association Convention on "How Governments Can Best Meet the Financial Crisis." Leland's opinion, commonly shared by his Chicago colleagues, was that public expenditures should be "synchronized with economic rhythms" and that "no hesitancy should be shown in borrowing to finance" capital outlays [4, pp. 109-10]. Leland charged that concern for the annually balanced budget had been responsible for the bulk of real and imaginary crises facing government: "It is erroneously conceived that this is the only proper policy year in and year out, regardless of economic conditions" [4, p. 108]. Leland pointed out that the budget should be geared to economic conditions and that "equilibrium between surplus and deficits should be struck over a period of years rather than annually" [4, p. 108].

*Jacob Viner (1933)*

As the depression deepened, Jacob Viner in particular continued to press for the execution of deficit budgets. In 1933, for example, he delivered a paper in the Day and Hour Series of the University of Minnesota [12]. Here, Viner carefully and somewhat bitterly criticized the "fear campaign" directed towards deficit budgets because it unnecessarily discounted the value of an otherwise sound policy. Viner's point was that countercyclical balancing of the budget calling for deficits during depression periods was part of a sound fiscal policy. Viner chided Hoover for offsetting with fear the beneficial effects of the unintentional deficits executed during the early 1930s: "The outstanding though unintentional achivement of the Hoover Administration in counteracting the depression has in fact been its deficits of the last two years, and it was only its own alleged fears as to the ill effects of these deficits, and the panic which the big business world professed to foresee in these deficits should recur, which have made this method of depression finance seriously risky" [12, pp. 18-19].

Only a few months later but still in 1933, Viner again spoke out on depression policy. Speaking at the Institute of Public Affairs of the University of Georgia, Viner recommended that the most promising method of combating the depression was "that of governmental expenditures financed by borrowing

from the banking system, with the hope that what the banks lend is newly created credit or credit which otherwise would have remained idle" [14, p. 133]. Again, Viner made it clear that sound principles of depression finance justified deficits being met either by new bank credit or by resorting to the printing press. Impatient by now with his antagonists, Viner lashed out that it was a mouldy fallacy to insist on balancing the budget in each year regardless of circumstances: "Why not in each month or week or hour?" [14, p. 129].

Viner then advanced a notion which Chicago economists had made familiar by 1933: the logical period for balancing the budget was the business cycle. And he pointed out that mere balancing was unsound during boom periods when a surplus should be executed either by building up cash reserves or by liquidating debt. This subject, however, became the object of still another pronouncement by the Chicago economists, this time in the form of a public policy pamphlet.

### Public Policy Pamphlet No. 1 (1933)

Still in 1933, some of the Chicago economists[4]—notably Simons and Viner —helped in the preparation of a policy statement regarding balancing the budget [3]. In the Public Policy Pamphlet No. 1, they began by warning of the retarding effects which annually balanced budgets have during depressions. They argued that it was not axiomatic that the federal government should annually collect revenues sufficient to defray even its ordinary operating expenses. Instead, many types of expenditures should be financed by short-term borrowing, long-term funding, or issuance of fiat money.

This Chicago group then repeated the argument which by 1933 had been advanced before every conceivable type of audience: "The balancing of budgets should be regarded as a series of long-term operations in which deficits will be incurred and debts increased during years of economic adversity while Treasury surpluses and the rapid retirement of the public debt will be planned for during years of prosperity" [3, p. 10]. When a series of annual budgets is put together, they continued, the result should be an equilibrium between revenue and expenditures intentionally struck over a period of years rather than annually.

### Concluding Remarks

On at least one occasion, the Chicago economists directly attempted to make their professional advice heard in Washington. In January, 1932, Henry Schultz, Jacob Viner, Garfield V. Cox, Frank H. Knight, John H. Cover, Lloyd W. Mints, Chester W. Wright, Harry D. Gideonse, Theodore O. Yntema, Harry A. Millis, Aaron Director, and Henry C. Simons were among the twenty-four participants of the Harris Foundation who signed a telegram to President Hoover, urging him to act favorably on (1) what later became the Glass-Steagall Act, which broadened the assets eligible for rediscounts with the Federal Reserve and permitted the Federal Reserve to use govern-

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[4] Signers of the statement were Frank Bane, Paul Betters, Carl Chatters, Paul H. Douglas, Simeon E. Leland, H. A. Millis, Clarence E. Ridley, H. C. Simons, Donald Slesinger, Jacob Viner and L. D. White.

ment bonds as well as commercial paper as collateral for its notes; (2) a systematic campaign of Federal Reserve open-market purchases; (3) R.F.C. aid to banks with ineligible assets; and (4) financing a public works program (of a magnitude not less than 1930-31) with deficits[5] [6, pp. 413-15]. Although unintentional deficits occurred during the Hoover Administration, Hoover was not dissuaded from his fetish of an annual balanced budget: the efforts of Knight, Simons, Viner, and the others to persuade Hoover to utilize large budgetary deficits were met with increasing determination to close the unintentional excess of expenditures over revenues.

In a significant way, the policy proposals of Keynes and the Chicago economists were remarkably similar during the early 1930s. Then why were many of this group unsympathetic to the *General Theory?* Friedman's answer— Keynes and the Chicago economists shared views regarding 1929-33, making the latter unsusceptible to the "Keynesian virus"—is only a partial answer. Much of the answer lies in an explanation offered by one of the key figures in the Chicago tradition: those who argued for large deficits from the early 1930s on, but who were critical of (if not hostile to) the *General Theory*, based most of their opposition on an interpretation of it as advocating deficits as a desirable, normal practice and as seeing in deficits a cure-all for everything which ailed the western world. In short, the group which had labored in behalf of the notion of *compensatory* public spending was unsympathetic towards the notion of *secular* public spending which they read into Keynes' *General Theory*.

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## A Comment on the Marginal Physical Product Curves for the CES and VES Production Functions

Some confusion seems to exist regarding the monotonicity of the marginal product curves for the CES production function [1]. This note demonstrates those conditions under which the marginal product curves are not monotonic. It will be seen that monotonicity depends upon both the values of the substitution and returns to scale parameters. The method used to analyze the CES case is applied to the Variable Elasticity of Substitution (VES) production functions [3] [4] as well.

Writing the CES production function as:[1]

$$(1) \qquad y = \gamma[\delta K^\rho + (1 - \delta)L^\rho]^{\nu/\rho},$$

where $y$ denotes output, $K$ capital input, $L$ labor input, $\gamma$ is the neutral efficiency parameter, $\delta$ is the distributive parameter, $\rho$ is the substitution parameter, and $\nu$ is the returns to scale parameter. One derives:

$$(2) \qquad f_L = \frac{\nu(1 - \delta)yL^{\rho-1}}{[\delta K^\rho + (1 - \delta)L^\rho]}, \qquad f_K = \frac{\nu\delta yK^{\rho-1}}{[\delta K^\rho + (1 - \delta)L^\rho]},$$

[1] Note that $\rho$ as used in this paper is the negative of the substitution parameter as defined by [1]. The analysis is made somewhat more elegant by this substitution.

where $f_L, f_K$ denote the marginal product curves for the CES with respect to labor and capital respectively. Owing to the symmetry with respect to $K$ and $L$ in the CES function one need consider only one of $f_L, f_K$. Thus, let $L^* = rL$, $0 < r < 1$, and consider the ratio $f_L/f_{L^*}$. If $f_L$ is a monotonically nonincreasing function of $L$, then $f_L/f_{L^*} \leq 1$ for all $L$ contained in the domain of definition of "$f$". If $f_L$ is nonmonotonic, then for some $L$, $f_L/f_{L^*} \leq 1$ and for other values of $L$, $f_L/f_{L^*} > 1$.

The ratio $f_L/f_{L^*}$ is given by:

(3)
$$f_L/f_{L^*} = \left( \frac{[\delta K^\rho + (1 - \delta)L^\rho]}{[\delta K^\rho + (1 - \delta)L^\rho r^\rho]} \right)^{(\nu/\rho - 1)} r^{1-\rho}$$

$$= r^{1-\rho} \left( \frac{P}{W} \right)^{\nu/\rho - 1}$$

where $P = [\delta K^\rho + (1-\delta)L^\rho]$ and $W = [\delta K^\rho + (1-\delta)L^\rho r^\rho]$.

There are four cases to be considered:

(i) If $\rho = 0$, the CES production function reduces to a Cobb-Douglas function of form:

$$y = \gamma K^{\nu\delta} L^{\nu(1-\delta)},$$

which has returns to scale parameter equal to $\nu$ and first partial derivatives:

$$f_L = \frac{\nu(1 - \delta)y}{L}, \qquad f_K = \frac{\nu\delta y}{K}.$$

As is well known, if $\nu(1-\delta) \leq 1$, then $f_L$ is a nonincreasing function of $L$; and if $\nu\delta \leq 1$, then $f_K$ is a nonincreasing function of $K$.

(ii) If $\rho = 1$, $f_L/f_{L^*} = [P/W]^{\nu-1}$ and $[P/W] > 1$. $f_L$ is monotonically nonincreasing only if $\nu \leq 1$. If $\nu > 1$, $f_L$ is monotonically increasing.

(iii) If $0 < \rho < 1$, $\lim_{L \to 0} f_L/f_{L^*} = r^{1-\rho}$, $\lim_{L \to \infty} f_L/f_{L^*} = r^{1-\nu}$. $f_L$ is decreasing for small $L$ for any $\nu$, but is nonincreasing for large $L$ only if $\nu \leq 1$. If $\nu > 1$, then for large $L$ $f_L$ is an increasing function of $L$.

(iv) If $\rho < 0$, $\lim_{L \to 0} f_L/f_{L^*} = r^{1-\nu}$, $\lim_{L \to \infty} f_L/f_{L^*} = r^{1-\rho}$. If $\nu \leq 1$, then $f_L$ is monotonically decreasing for all $L$. If, however, $\nu > 1$, $f_L$ is an increasing function of $L$ for small $L$ and a decreasing function for large $L$. This latter case is interesting for it exhibits a "neo classical" property of production functions not held by the Cobb-Douglas, which is the most widely used function.

To summarize, if $\nu \leq 1$, then $f_L$ is monotonically nonincreasing for any value of $\rho$. If $\rho = 0$, one has the case of the Cobb-Douglas production function which has monotonic partials for any value of $\nu$. The function $f_L$ is nonmonotonic if $\nu > 1$ and $\rho \neq 0$ or 1. Thus, ignoring the two special cases of the CES corresponding to $\rho = 0$ and $\rho = 1$ (the Cobb-Douglas and linear production function cases respectively), one notes that the marginal product curves will be nonmonotonic if the returns to scale parameter is greater than one.

The extension to the generalized CES production function of Dhrymes and Kurz [2], where the production function is defined by:

$$(4) \qquad y = \gamma[\delta_1 K^{\beta_1} + \delta_2 L^{\beta_2}]^{\nu/\rho},$$

follows easily using the approach outlined above. One notes, however, that in this case the conditions for monotonicity depend upon the values of three parameters, $\beta_i$, $i=1$ or 2, $\nu$, and $\rho$. Note also that the marginal product of labor may be monotonic and that of capital nonmonotonic or vice versa.

Consider now the variable elasticity of substitution production function (VES) in the form considered by Revanker [3]:

$$(5) \qquad y = \gamma K^{\alpha(1-\delta\rho)}[L + (\rho - 1)K]^{\alpha\delta\rho},$$

where $y$, $K$, $L$ have the same interpretation as before. The parameters, however, are different in the two functions. Using "$f_L$" and "$f_K$" to denote the marginal product curves for the VES, one has:

$$f_L = \frac{\alpha\delta\rho y}{L + (\rho - 1)K}, \qquad f_K = \alpha(1 - \delta\rho)y/K + \frac{\alpha\delta\rho(\rho - 1)y}{L + (\rho - 1)K}.$$

These curves are nonnegative if one assumes that $\alpha\delta\rho$ and $L+(\rho-1)K$ are nonnegative. Under these assumptions we proceed to analyze the marginal product curves for the VES.

As with the CES production function consider the ratio $f_L/f_{L*}$, where $L^*=rL$, $0<r<1$, for any $L$. Letting $P=[L+(\rho-1)K]$ and $W=[rL+(\rho-1)K]$, one has:

  (i) $[P/W]>1$,
  (ii) $f_L/f_{L*}=[P/W]^{\alpha\delta\rho-1}$,

so that if $\alpha\delta\rho\leq 1$, $f_L$ will be nonincreasing for all $L$.

Because of the asymmetry of the VES producton function one must now examine the marginal physical product curve for capital. Similarly to the previous case one considers the ratio $f_K/f_{K*}$, where $K^*=rK$, $0<r<1$. The first partial derivative with respect to $K$ is given by:

$$f_K = \gamma K^{\alpha(1-\delta\rho)}[L + (\rho - 1)K]^{\alpha\delta\rho}[\alpha(1 - \delta\rho)K^{-1} \\ + \alpha\delta\rho(\rho - 1)(L + (\rho - 1)K)^{-1}].$$

For $K$ small and any non-negative $L$,

$$\frac{f_K}{f_{K*}} \doteq \left(\frac{1}{r}\right)^{\alpha(1-\delta\rho)} \cdot r = r^{1-\alpha(1-\delta\rho)},$$

as $(L+(\rho-1)K)\doteq L$. Thus, if $\alpha(1-\alpha\rho)\leq 1$, $f_K$ is nonincreasing for small $K$, and if $\alpha(1-\delta\rho)>1$, $f_K$ is an increasing function of $K$ for small $K$. If $K$ is large, $[L+(\rho-1)K]\doteq(\rho-1)K$ so that:

$$f_K \doteq \gamma K^{\alpha(1-\delta\rho)}(\rho - 1)^{\alpha\delta\rho}K^{\gamma\delta\rho}[\alpha(1 - \delta\rho)K^{-1} + \alpha\delta\rho K^{-1}],$$

$$\therefore \frac{f_K}{f_{K*}} \doteq \left(\frac{1}{r}\right)^{\alpha-1} = r^{1-\alpha},$$

in which case $f_K$ is nonincreasing if $\alpha \leq 1$. Thus, one concludes that, if $\alpha \leq 1$ and $\alpha(1-\delta\rho) \leq 1$, $f_K$ is monotonically decreasing. On the other hand, if $\alpha(1-\delta\rho) > 1$, then for small $K$, $f_K$ is an increasing function of $K$, but for large $K$ is decreasing. However, as one requires $0 < \alpha\delta\rho \leq 1$ for $f_L$ to be nonnegative and a decreasing function of $L$, the latter case will not hold.

In summary, for values of $\alpha$ and $\alpha\delta\rho$ which satisfy the neoclassical conditions that the marginal product curve should be positive and nonincreasing over some domain of the function, the VES has marginal product curves which are monotonically decreasing functions of their respective arguments.

In conclusion, therefore, one notes that of the three production functions currently being discussed in the literature, namely the Cobb-Douglas, CES, and VES production functions, only the CES has the property of nonmonotonic marginal product curves for certain values of its parameters. The discussion above has shown that for the VES both marginal product curves are monotonic. The properties of the Cobb-Douglas are well known and do not warrant discussion.

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## On Varying the Constants in a Linear Programming Model of the Firm

The articles by Robert Dorfman and William Baumol in this journal have done much to familiarize its readers with the usefulness and economic meaning of linear programming [6] [2]. Other contributions have extended this discussion [1] [3] [5] [7] [11] [12]. Further appreciation of some of its characteristics and potentiality can be gained by exploring the effect on an optimal program of varying the constants.[1] In the usual linear pro-

[1] The systematic procedures for such analysis where the original values of the constants are varied or are changed continuously into new values are usually referred to as parametric linear programming [8, pp. 220–31] [9, pp. 123–42] [10, pp. 379–95].

gramming problem the constants represent such things as (a) fixed capacities or availabilities of factors of production, (b) constant unit variable costs, unit revenues, or unit profits, and (c) constant rates of utilization of each factor capacity per unit of product output. For purposes of exposition a simplified example which lends itself easily to graphical description will be examined.

## I. *A General Formulation*

Consider the case of a firm faced with a production decision for a future period. A single product is produced which can be accomplished by only two different processes. Each process uses different, but constant, amounts of the fixed factors in producing each unit of product. Only two fixed factors exist and variable factors may be acquired in amounts needed in a purely competitive market. Also, the product output can be sold in a purely competitive market. The problem can be viewed as one of choosing a production program (that is, a combination of processes) which maximizes total profit subject to the restriction that the program does not require more of any of the fixed factors than is available.

A common general notation for the case of two variables and two restraints, and the nonnegativity conditions, gives us the following formulation:

(1) $$\text{Maximize } f = c_1 x_1 + c_2 x_2$$

subject to the following constraints

(2) $$a_{11} x_1 + a_{12} x_2 \leqq b_1$$

(3) $$a_{21} x_1 + a_{22} x_2 \leqq b_2$$

(4) $$x_1, x_2 \geqq 0$$

where

$f$ = total profit, to be interpreted as the excess of total revenue over total variable costs or "profit" before deducting fixed costs.

$x_1$ = level of Process 1, to be interpreted as the number of units produced by Process 1

$x_2$ = level of Process 2, to be interpreted as the number of units produced by Process 2

$b_1$ = quantity of Factor 1 available

$b_2$ = quantity of Factor 2 available

$a_{11}$ = amount of $b_1$ used in the production of each unit of output by Process 1

$a_{12}$ = amount of $b_1$ used in the production of each unit of output by Process 2

$a_{21}$ = amount of $b_2$ used in the production of each unit of output by Process 1

$a_{22}$ = amount of $b_2$ used in the production of each unit of output by Process 2

Maximize $f = 2x_1 + 2x_2$
Subject to
$2x_1 + x_2 \leq 8$
$x_1 + 3x_2 \leq 9$

$x_1, x_2 \geq 0$

$x_2$

$2x_1 + x_2 = 8$

$(3, 2)$

$x_1 + 3x_2 = 9$

$2x_1 + 2x_2 = 4$      $2x_1 + 2x_2 = 10$

$x_1$
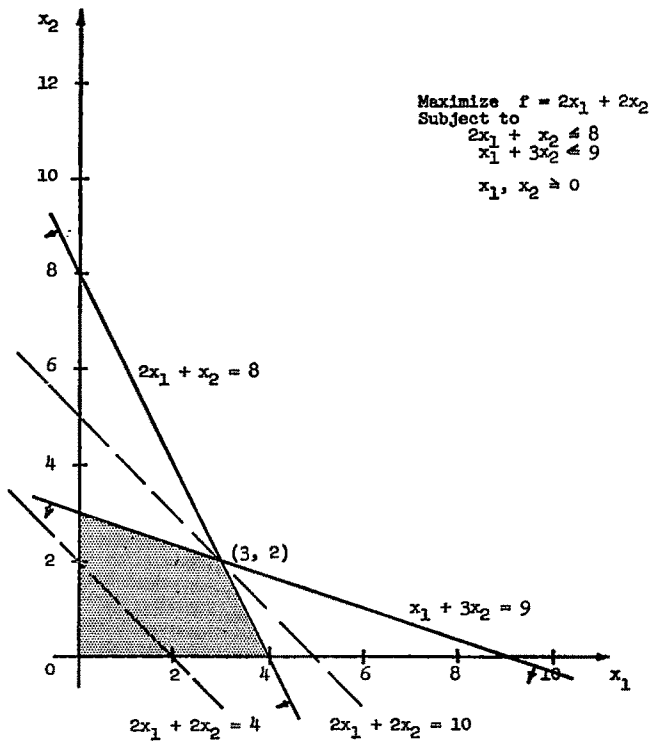
FIGURE 1

$c_1 =$ profit per unit of output produced by Process 1
$c_2 =$ profit per unit of output produced by Process 2

## II. *A Numerical Example*

A simple numerical example will serve to convey the effect of the subsequent varying of the constants in the original problem. The original problem may be represented in the following way:

(5)                     Maximize $f = 2x_1 + 2x_2$

subject to the following constraints

(6)                          $2x_1 + x_2 \leq 8$

(7)                          $x_1 + 3x_2 \leq 9$

(8)                          $x_1, x_2 \geq 0$

The graphical solution may be viewed in two ways. First, by plotting the constraint inequalities and the objective function on the $x_1$ and $x_2$ axes as shown in Figure 1. The shaded area represents the intersection of the sets defined by the inequalities (6), (7), and (8) and can be interpreted as the
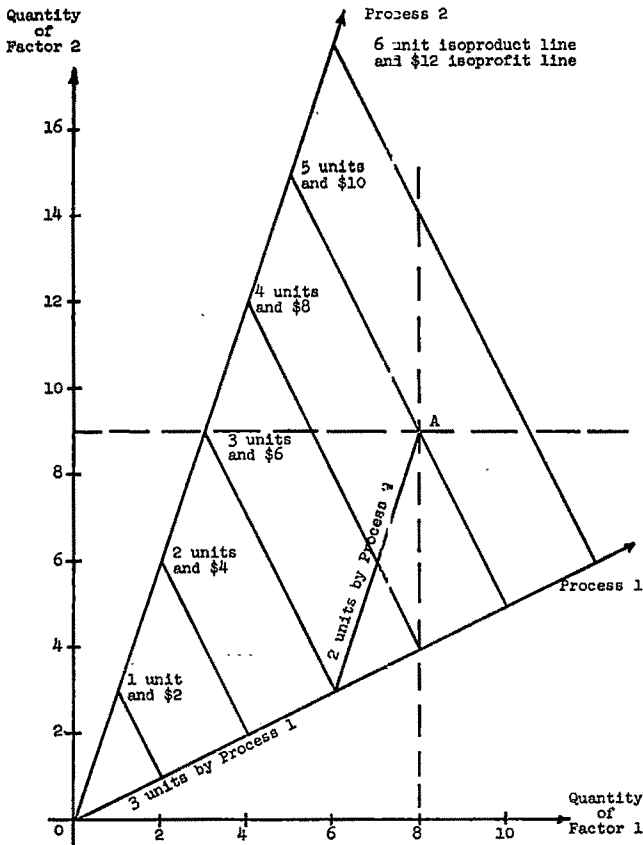
FIGURE 2

set of all feasible programs. In this example an optimal feasible program is the point of intersection of the graph of (5) for $f = 10$ and the feasible solution set.[2] This intersection is a point in the set that is "most distant" from the origin in the "optimizing direction." The program is $x_1 = 3$, that is, 3 units by Process 1; and $x_2 = 2$, that is, 2 units by Process 2. Total output is 5 units, the sum of the outputs by each of the processes. Total profit is $10.00.

The second graphical solution is seen in Figure 2. The same problem now is graphed with quantity of Factor 1 on the horizontal axis and quantity of Factor 2 on the vertical axis. Attention now is focused upon the Process 1 and Process 2 production rays and some relevant isoproduct and isoprofit lines. The dashed lines perpendicular to the axes represent the

[2] Linear programming problems can have one, two, or infinitely many optimal solutions. However, the initial example considered here and its subsequent changes with new values for the constants will have unique optimal solutions.

Maximize $f = 2x_1 + 2x_2$
Subject to
$$2x_1 + x_2 \leqq 9$$
$$x_1 + 3x_2 \leqq 9$$
$$x_1, x_2 \geqq 0$$
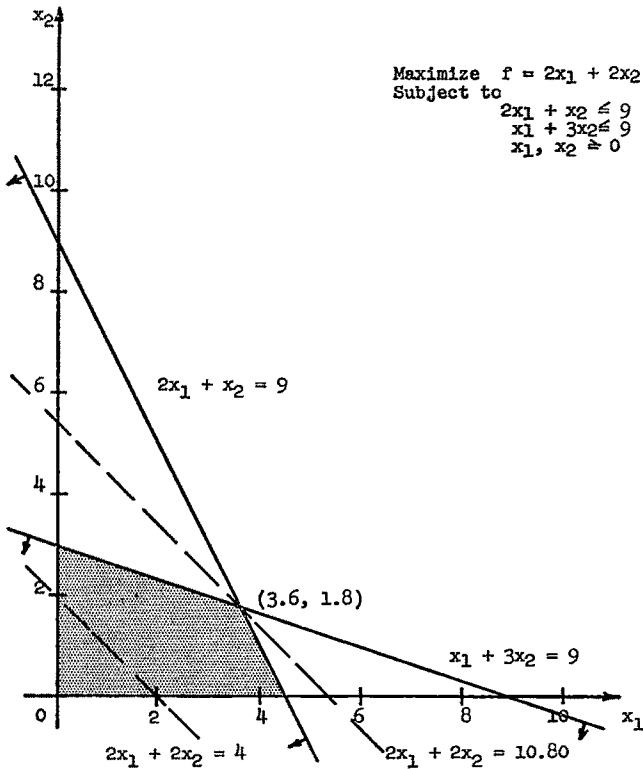
FIGURE 3

existing factor limitations on attaining higher isoproduct or isoprofit levels. The optimal output is observed again to be 5 units with $10.00 profit. The highest isoprofit line which still intersects a point in the feasible area is seen at point A. The optimal combination of processes is not so directly seen, but the only way 5 units of output is possible is to go out 3 units on Process 1 ray and 2 units on Process 2 ray or vice versa [6, pp. 805-6] [1, p. 278].

The constants $c_j$, $b_i$, and $a_{ij}$ now might be varied one at a time in the original numerical problem. The effect upon optimal output, optimal combination of processes, and optimal profit can thus be observed. There will be a return to the original problem as the value of one constant after another is altered.

*Changes in the $b_i$*

By varying the $b_i$ values the effect of such things as increases or decreases in resource availabilities can be explored. Let us increase the $b_1$ in (6) from 8 to 9. This increases the quantity of Factor 1 available and the effect on optimal output, program, and profit can be seen from Figures 3 and 4. The output is now 5.4 units; the program is: $x_1 = 3.6$; $x_2 = 1.8$; the total profit
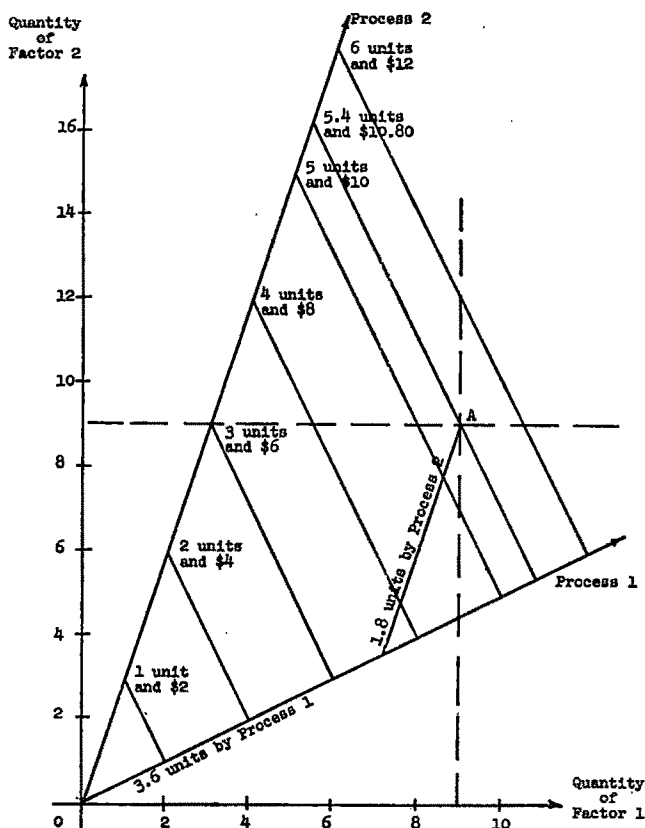
FIGURE 4

is $10.80. The effect on profit is of special interest. The marginal contribution to profit of the 9th unit of Factor 1 (not taking into account its cost) is $10.80−$10.00=$.80.

If there had been no variable costs in the example so that unit profits in the objective function were equal to unit revenues the increase in the total profit level from the unit increase in Factor 1 would give us the familiar marginal revenue product of the factor over that particular unit interval.

*Changes in the $c_j$*

The $c_j$ values in the example represent profits for each unit of output by each process. Unit profit is to be interpreted as the excess of unit revenue over unit variable cost. Thus, changes in unit profits may arise from (a) a change in price in the market for the output, (b) a change in price in the market for the variable factor, or (c) a combination of (a) and (b).

Thus with this extremely simple example we can illustrate the nature of the procedure for deriving the firm's supply schedule in the output market.
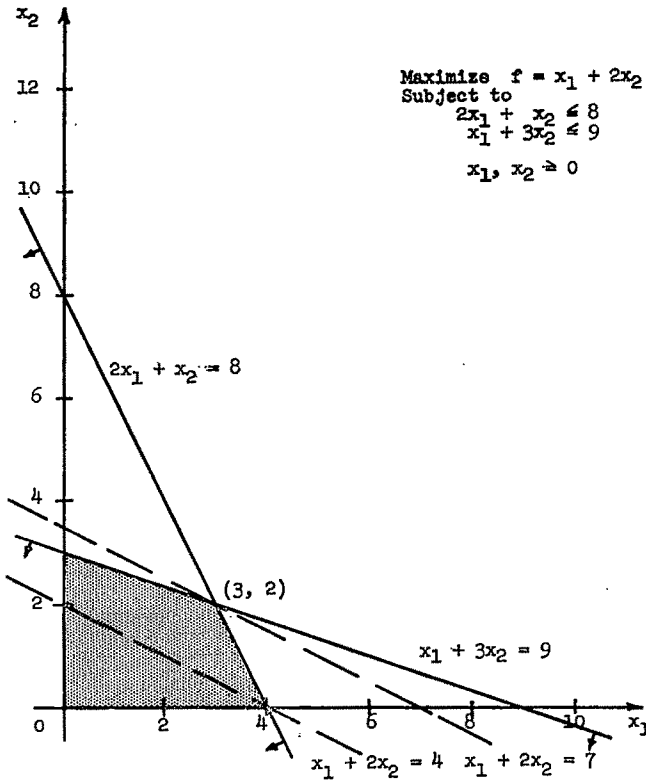
FIGURE 5

With merely two processes the supply schedule is not very interesting but realism can be approached by including more processes, products, and factors. If price in the output market increased by an amount which increased unit profits, $c_1$ and $c_2$, from \$2.00 to \$4.00 in (5) the optimal output and program would remain the same. Thus, within that output price range, and for this short-run period, the firm would continue to supply 5 units of output, but now would be attaining a profit level of \$20.00. When numerous products as well as processes are involved all the $c_j$ would typically not change together and thus the slope of the objective function would change, often resulting in different optimal outputs and programs.

A change in the $c_j$ might also come about due to a change in unit variable cost associated with a single process or a group of processes. To illustrate in terms of the numerical example let us say unit variable cost rises in production by Process 1 so that $c_1$ decreases from \$2.00 to \$1.00. Say a price increase occurred in the market for the variable factor which is used in Process 1 but is not used in Process 2. Suppose further that its price increase caused the above unit profit change in $c_1$. Any change in the amount of output produced by Process 1 will in turn cause a change in the amount of
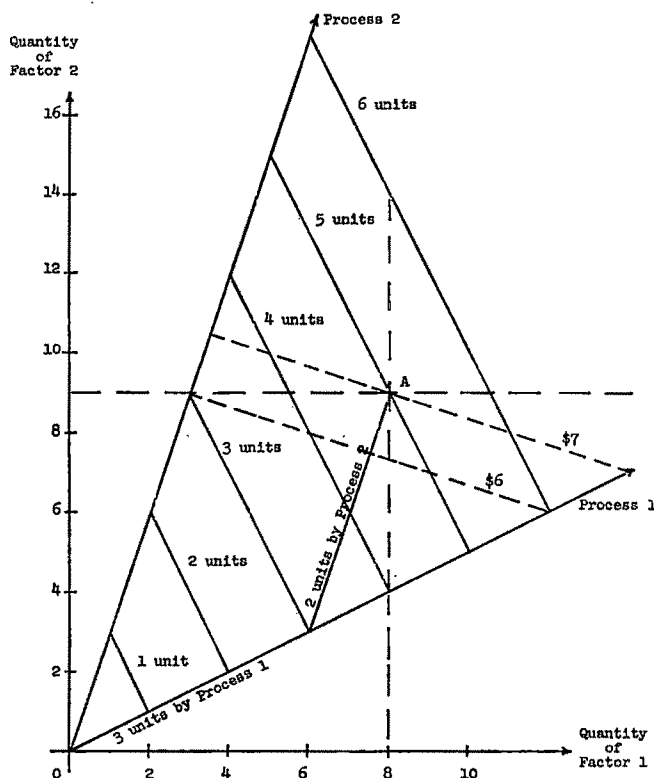
FIGURE 6

the variable factor required by that process. Thus, the firm's short-run demand schedule for the variable factor could be derived in this fashion.

In the simple example the effect of the change in $c_1$ can be seen in Figure 5. The slope of the objective function changes but the optimal output remains at 5, and the optimal program remains: $x_1=3$; $x_2=2$. The value of this optimal program, however, has fallen to $7.00. A graphical solution also appears in Figure 6. The highest isoprofit line attainable is $7.00 and the associated optimal output and optimal program also can be observed.

*Changes in the $a_{ij}$*

In producing a unit of output by Process 1, $a_{11}$ units of Factor 1 would be used and $a_{21}$ units of Factor 2. These $a_{ij}$ values reveal the constant factor input proportions in producing output by that process. Their graphic representation gives us the production or process ray and reminds one that the assumption of constant returns to scale has been made. Similarly, by Process 2 a unit of output would use $a_{12}$ units of Factor 1 and $a_{22}$ units of Factor 2.

In the numerical example the $a_{12}$ value was 1 and the $a_{22}$ value was 3 as seen in (6) and (7). Thus the slope of the Process 2 ray was 3. For each unit

Maximize $f = 2x_1 + 2x_2$
Subject to
$$2x_1 + x_2 \leqslant 8$$
$$x_1 + 2x_2 \leqslant 9$$
$$x_1, x_2 \geqslant 0$$
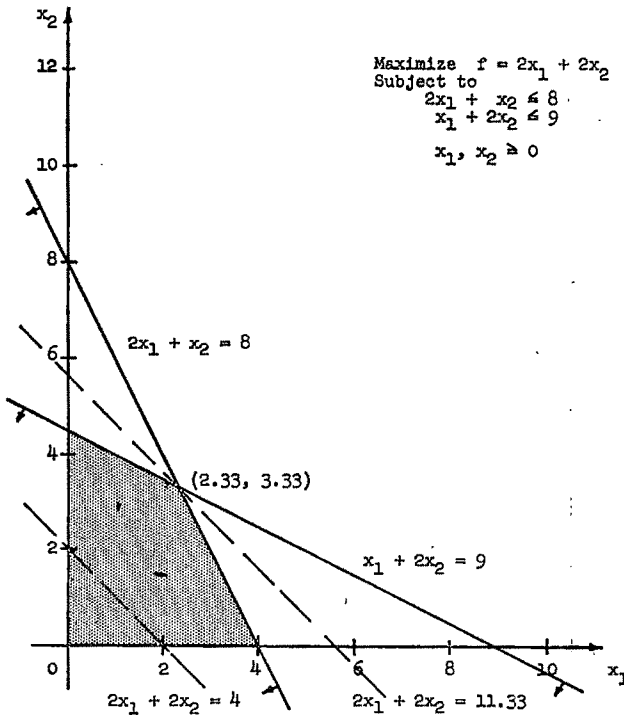
FIGURE 7

of output produced by Process 2, 1 unit of Factor 1 was used and 3 units of Factor 2 were used. Now consider a technological change which might be considered a modification of Process 2. Say that it results in a change in $a_{22}$ from 3 to 2 in (7). This changes the slope of the ray from 3 to 2 and in effect creates a new process ray. The effect of the technological change can now be observed in Figures 7 and 8. The optimal output is now 5.67; the optimal program is: $x_1 = 2.33$; $x_2 = 3.33$; and total profit is $11.33. The change increased total profit by $1.33.

By increasing the number of process rays one can approach the familiar isoproduct curves of standard marginal analysis and thus begin to observe the essential unity of the two approaches. The linear programming approach, at times, has some advantages in view of (a) the difficulty of obtaining marginal data in practical problems, (b) the existence of choice in producing many different products or engaging in many different activities, and (c) the existence of efficient computational methods and modern electronic computing equipment. In addition to the provision of efficient solution algorithms for linear programming problems several computer manufacturers have computer programs which permit individual parameter variation of the $b_i$, the $c_j$, and the $a_{ij}$; simultaneous parameter varia-
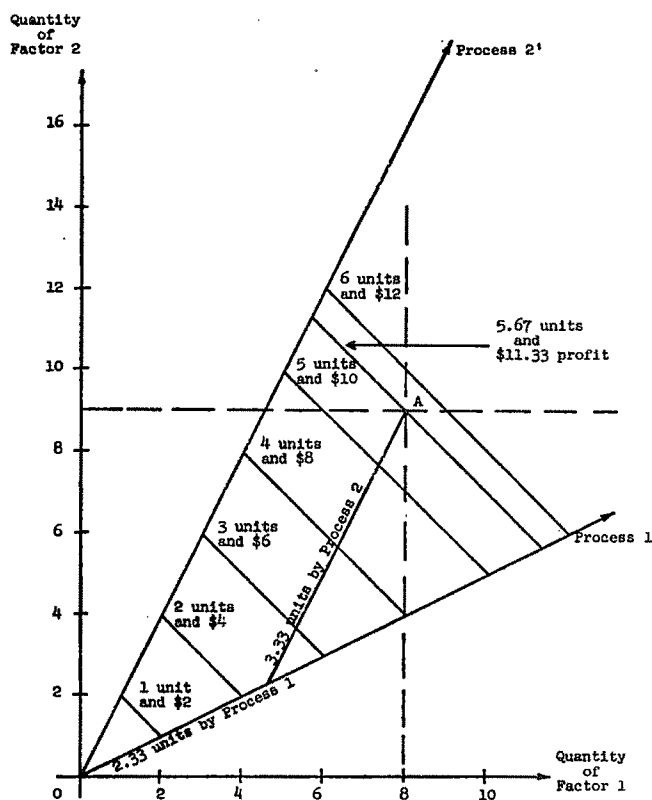
FIGURE 8

tion of the $b_i$, and the $c_j$; and simultaneous variation of the $b_i$, the $c_j$; and the $a_{ij}$ (the latter one row or column at a time).

Useful discussions on the exploration and analysis of linear programming problems are given by Spivey [12, pp. 166–80], Hadley [10, pp. 379–95], Garvin [8, pp. 49–61, 220–31], Dantzig [4, pp. 265–75], and Gass [9, pp. 123–41].

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# The Average Level of Schooling and the Intra-Regional Inequality of Income: A Clarification

## I. *Introduction*

In the March 1967 issue of this *Review*, A. Al-Samarrie and H. P. Miller [2] and D. J. Aigner and A. J. Heins [1] attempt to explain state-to-state variations in income concentration by means of cross-sectional multiple regression analysis for the United States. Aigner and Heins indicate that their purpose is "to report further evidence of the tendency for the personal income of a region to be more equally divided the more maturely developed is the region" [1, p. 175]. Al-Samarrie and Miller conclude that the level of education is "highly [inversely] correlated with income concentration" [2, pp. 61 and 71]. Simon Kuznets examined international and interregional data and reported that countries and regions at a lower level of income tend to have a greater income inequality [8] [9]. The conclusions of these and other writers support the commonly held view that the distribution of income is more equal the higher the level of income or schooling in a region.[1]

Aigner and Heins state that "there is no formal theory available which satisfactorily concerns itself with the relationship between development and the inequality of incomes" [1, p. 176]. They also indicate that they have nothing more than a "naive theory" for relating their variable for level of schooling (which they use to "describe the basic skill level of each state population") to income inequality [1, pp. 177–78].[2]

I have two purposes in writing this note. I wish to show that a specific theory, the theory of investment in human capital, may be used to demonstrate that, across regions, the level of schooling can be related to income

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[1] This view is so common among economists that it is frequently expressed in textbooks on economic principles without qualifications. For example, see P. Samuelson [11, p. 111, note to figure 6-3(a)].

[2] Kuznets indicates that we lack "a firm set of links between the observable changes in the production structure that constitute economic growth and the observable *associated* changes in the income distribution" [9, p. 2]. In his discussion of the relationship between the level and inequality of income there is an absence of an explicit consideration of the effect of training or schooling on the distribution of income [8] [9].

inequality and that, *ceteris paribus*, this relation is positive.[3] I will also demonstrate that the observed negative simple correlation for the states of the United States may be related to the omission of two variables that are relevant to the determination of income inequality. These variables are the average rate of return from schooling and the inequality in the distribution of years of schooling attended.

A model is presented in section II in which relative income inequality is related to the levels and inequalities of years of schooling and rates of return from schooling. This model is employed in section III to ascertain the relation between income inequality and the average level of schooling for the states of the United States when the rate of return and schooling inequality are held constant. The relationships among the schooling and income parameters are discussed in section IV. Section V contains the conclusions of this note.

## II. *The Model*

On the basis of an earlier article (with different notation) in this *Review* [4], it can be shown that if, for the $i$th person, $Y_{S,i}$ were income after $S_i$ years of investment in schooling, $\overline{Y}_0$ were the average zero schooling level of income, $r_i$ were the adjusted rate of return from schooling,[4] and $U_i$ were the residual, then approximately,

$$(1) \qquad \text{Ln} \ (Y_{S,i}) = \text{Ln} \ \overline{Y}_0 + r_i S_i + U_i.$$

For simplicity, let us neglect the residual $U_i$ and assume that all income above $\overline{Y}_0$ is due to investments in training. Then, if we calculate the variances of both sides of equation (1), we obtain

$$(2) \qquad \text{Var} \ (\text{Ln} \ Y_i) = \text{Var} \ (r_i S_i),$$

where Var means variance. The relative variance of income depends on the absolute variance of the product of the adjusted rate of return and the number of years of schooling. The variance of the natural logarithm of income is a commonly used measure of income inequality.

The variance of a product of two independent random variables, $r_i$ and $S_i$, can be expressed as [7]

$$(3) \qquad \text{Var} \ (r_i S_i) = \bar{r}^2 \ \text{Var} \ (S_i) + \overline{S}^2 \ \text{Var} \ (r_i) + \text{Var} \ (S_i) \ \text{Var} \ (r_i).$$

Thus, if $r_i$ and $S_i$ were independent, the relative variance of income would be positively related to the average level and the variance of each variable.

It is not likely that, in a region, the rate of return to individuals and their level of schooling are independent [4]. The variance of a product of two variables that are not independent can be evaluated [7], but this is not needed for the present purpose. The preceding implies that, *ceteris paribus*, the

[3] Mincer [10] has shown that, within regions, income inequality increases with higher levels of occupation, schooling, and age.

[4] For each individual, $r_i$ is the average rate of return from his investment in schooling adjusted for the average fraction of earnings foregone during the period of investment [4, pp. 363–64].

intraregional relative inequality of income would be positively related to the average levels and the variances of both years of schooling and rates of return from schooling even if, for individuals, levels of schooling and rates of return were not independent.

### III. *Interstate Analysis*

Although many average internal rates of return from schooling have been estimated in recent years, no such calculations have been made for the states. I have calculated [5, Chs. 2 and 3] regression estimates of rates of return from schooling for the 51 states for adult "white males" using the

TABLE 1—MATRIX OF CORRELATION COEFFICIENTS FOR THE STATES[a]

|                | Var (Ln $Y$) | $\bar{r}$ | Var ($S$) |
|----------------|--------------|-----------|-----------|
| $\bar{r}$      | .835         |           |           |
| Var ($S$)      | .490         | .316      |           |
| AV ($S$)       | −.161        | −.369     | −.208     |
|                | *Probability*[b] | $R$   |           |
|                | .050         | .231      |           |
|                | .025         | .273      |           |
|                | .010         | .322      |           |

[a] Ln $Y$=natural log of income

　　$\bar{r}$=regression estimate of the average adjusted rate of return from schooling

　　$S$=years of schooling attended

　Var=variance

　AV=average

[b] The probabilities represent the chance that sample estimates of the correlation coefficients ($R$) will be greater than the values given. The probabilities are based on 50 degrees of freedom.

*Sources:* [12, Pts. 2–52, Table 138] and [5, Ch. 3, Tables I-1, I-2].

1960 Census of Population [12, Table 138].[5] The average levels and variances of schooling for the states have been calculated from the same source. As of the present, no estimates exist for the inequality of rates of return within states.

Table 1 presents simple correlation coefficients for adult white males in the states. The average rate of return ($\bar{r}$) and schooling inequality (Var($S$)) are significantly (at a one per cent level) positively correlated with income inequality. The level of schooling is negatively correlated with the inequality of income. This last correlation is consistent with the empirical findings of other studies [1] [2] [4] [8] [9].

Note, however, that the average level of schooling is negatively correlated with the estimated average rate of return and the inequality of schooling. What would be the relation between average level of schooling and income

[5] The District of Columbia is considered a state. "White males" means that nonwhites were excluded from 17 states—the 16 states in which nonwhites constitute 10 per cent or more of adult males plus New York.

| Explanatory Variable | Coefficient | Student's $t$ Ratio |
|---|---|---|
| AV (S) | 0.033 | 2.734 |
| $\bar{r}$ | 6.945 | 10.961 |
| Var (S) | 0.012 | 3.822 |

[a] For notation and definitions, see Table 1.
*Sources:* Same as Table 1.

inequality if we held constant both the average rate of return and schooling inequality?

Table 2 contains the results from a multiple linear regression of the variance of the log of income on the average level of schooling, the average rate of return, and schooling inequality. The partial slope coefficient of each of the three variables is significantly positive at a one per cent level. These results are consistent with the hypothesis derived from the model in section II which relates income inequality to schooling.

## IV. *Relationships Among the Parameters*

The signs of the correlation coefficients among the average level of schooling, the average rate of return, and the inequality of schooling are not clear a priori. The average rate of return is largely determined by average supply and demand conditions for funds for investment in human capital.[6] The inequality of schooling depends primarily on the inequality in these conditions within the region.[7] It is not clear that the level and inequality of the supply and demand conditions for funds need be related.[8]

If economic growth resulted in changes in only the demand conditions for human capital, there would be a rise in the rate of return and the level of schooling. However, the increases in wealth and the improved capital markets associated with economic growth would lower the cost of funds for investment in human capital, and this would raise the average level of schooling but decrease the average rate of return from schooling. Thus, the effect of economic growth on the rate of return is ambiguous.

The low level of income and the less perfect capital markets of less developed regions increase the rate of return. If inter-area migration did not exist, the smaller demand for human capital by less developed regions

[6] The level and the elasticity of the average supply curve for funds for investment in human capital largely depend on the level of wealth in the economy and the stage of development of the capital market. The level and the elasticity of the average demand curve for funds are, in part, derived from the demand by the economy for human capital and the average level and elasticity of ability.

[7] The inequality in the supply conditions for funds depends primarily on differences in individual wealth and access to funds, while the inequality in demand conditions depends largely on differences in ability.

[8] Although the average rate of return and schooling inequality are significantly positively correlated for all of the states (for all males and white males only), they are uncorrelated for the states of the South and white non-South and significantly negatively correlated for the states of the non-South and white South [5, Ch. 3 and Table F-1].

would lower the rate of return. Labor markets are more national and international in scope the higher the level of schooling. This tends to produce a negative relation between the average level of schooling and the average rate of return.[9] Although the sign of the net effect is indeterminate, the algebraic value of the correlation coefficient between the average level of schooling and the average rate of return would be lower the greater the relative interregional mobility of skilled labor.[10] Indeed, migration may generally result in a negative correlation across the regions of a country.

The effect of changes in either the supply or the demand conditions for human capital on schooling inequality depends on which parts of the distribution of schooling increase their level of schooling. The coefficient of variation of years of schooling, $[\text{Var}(S)/\bar{S}^2]^{1/2}$, seems to decline with the rise in the level of schooling associated with economic growth, but it is not clear whether the variance of years of schooling increases or decreases.[11]

Thus, there appear to be no a priori reasons, nor consistent empirical findings, for expecting the average level of schooling to be negatively related to the inequality of schooling, nor for expecting a positive relation between the latter parameter and the average rate of return. The average level of schooling and the average rate of return may tend to be negatively correlated among regions for which there is much mobility of skilled labor.

Since it appears that the rate of return is more powerful than the level of schooling in explaining income inequality [5, Chs. 3 and 4], a negative correlation between the level of schooling and the rate of return would result in a negative simple correlation between the level of schooling and the inequality of income. Thus, it is consistent with economic analysis for the level of schooling and the inequality of income to have a positive partial but a negative simple correlation across the regions of a country. The level of schooling and the rate of return are less likely to be negatively correlated across countries than across sections of a country, and, therefore, it is less likely that a negative simple correlation between the level of schooling and income inequality would appear in an international analysis.

## V. Conclusions

*Ceteris paribus*, the higher the average level of schooling in a region, the greater the inequality of income in that region. If simple correlation coefficients are examined, other variables (in particular, the average rate of return) may produce a negative simple correlation.

[9] Empirical studies for the United States indicate that rates of migration across states tend to increase with higher levels of schooling [3, p. 89 note] [6]. The greater relative mobility of educated workers is due, in part, to the components of the information and migration costs which are largely independent of the level of schooling.

A higher rate of migration for educated workers depresses the average rate of return from training in the area of in-migration (an area with high levels of income and schooling) and increases the average rate of return in the area of out-migration (an area with low levels of income and schooling).

[10] This may explain the significant negative correlation between the average rate of return and the average level of schooling in Table 1.

[11] Although the correlation between level and inequality of schooling is negative in the United States, it is positive for the provinces of Canada and the regions of the Netherlands [5, Ch. 3 and Table F-1].

The greater the relative mobility of those with higher levels of schooling, the larger is the negative correlation between the average level of schooling and the average rate of return, and, thus, the greater is the likelihood of a negative simple relation between the average level of schooling and income inequality. It is not surprising, therefore, that the average level of schooling and the inequality of income have a negative simple and a positive partial correlation across the states of the United States. We would expect a similar pattern to appear across the regions of other countries, but it is less clear that such a pattern exists in cross-sectional international data. It might be useful to perform an international analysis if the relevant data were available.

The changes in the distribution of schooling associated with economic growth are likely to result in an *increase* in income inequality, since the average level of schooling increases, and even if schooling inequality were to decline, its decline would tend to be small.

<div align="right">BARRY R. CHISWICK*</div>

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## The Degree of Moneyness of Savings Deposits

The postwar period has been characterized by two important changes in the liabilities of nonmonetary intermediaries. First, the liabilities of these institutions have grown at a faster rate than the liabilities of commercial banks. For example, mutual savings deposits have increased from $16 billion in 1946 to $54 billion in 1966. Savings and loan share capital increased from $8 billion to $111 billion during the same period. On the other hand, total commercial bank deposits increased from $112 billion to $288 billion during the same period. Second, since 1950 the insurance provisions applicable to savings and loan shares were revised and made comparable to those applicable on commercial bank deposits insured by the FDIC. The rapid growth of the liabilities of the intermediaries has raised an important issue concerning the degree to which these liabilities can be substituted for money. Gurley and Shaw [1, 2, 3], after an elaborate examination of the role of nonmonetary intermediaries in the economy, maintain that the liabilities of these institutions are close substitutes for money and that the rapid growth of these liabilities in recent decades has had the effect of reducing the demand for money. However, recently Timberlake and Fortson [4] used a test for analyzing the degree of moneyness of time deposits and found that except for the period 1933–38, time deposits lacked moneyness.

In view of the fact that the quantitative and qualitative changes in the liabilities of nonmonetary intermediaries have occurred in the postwar period, it was decided to focus attention on this period. In the following analysis, the Timberlake-Fortson technique is used to test the degree of moneyness of diverse stocks of savings deposits using quarterly data for the period 1947 to 1966. The concepts used in the analysis are defined as follows:

$Y =$ Consumption+net private domestic investment+net foreign investment+government deficit on income and product account.
$M =$ Currency outside banks+demand deposits adjusted.
$S_1 =$ Commercial bank time deposits.
$S_2 = S_1+$mutual savings deposits+postal deposits.
$S_3 = S_2+$savings and loan share capital.[1]

It may be pointed out that the above definition of money income, $Y$, corresponds to the one used by Timberlake and Fortson, and the savings deposits variable used by them corresponds to our $S_2$. To test the degree of moneyness of savings deposits, multiple regression analysis is employed using first differences in $M$ and in the relevant stock of savings deposits, to predict changes in income, $Y$. For testing the relationship, the following formulation suggested by Timberlake and Fortson is used:

$$\Delta Y = a + b\Delta M + c\Delta S \qquad (i)$$

[1] The decision to broaden the savings deposits variable, $S_2$, to include savings and loan share capital was prompted by the fact that for practical purposes it appears that savings and loan shares are similar to time deposits in commercial and mutual banks.

or

$$\Delta Y = a + b \left[ \Delta M + \frac{c}{b} \Delta S \right] \qquad \text{(ii)}$$

where $S$ represents the relevant savings deposits variable. If savings deposits have some degree of moneyness, the ratio $c/b$ would be greater than zero but less than one. If the value of $c/b$ equals one, savings deposits may be said to have the same degree of moneyness as the items in $M$.

The results presented in Table I show that all three stocks of savings de-

TABLE 1—MULTIPLE LINEAR REGRESSION EQUATIONS BETWEEN FIRST DIFFERENCES IN $Y$
AND FIRST DIFFERENCES IN $M$ AND $S$. QUARTERLY FIGURES, 1947 (II)–1966 (IV)

| Number | Dependent Variable | Constant | $b$ Regression Coefficient of $\Delta M$ | $c$ Regression Coefficient of $\Delta S_1$, $\Delta S_2$, $\Delta S_3$. | $c/b$ | $R$ |
|---|---|---|---|---|---|---|
| 1 | $\Delta Y$ | 2.7597 | 1.1866 $\Delta M$ (0.5358) [0.2463] | 0.6865 $\Delta S_1$ (0.3038) [0.2509] | 0.5785 | .4280 |
| 2 | $\Delta Y$ | 2.6695 | 1.2017 $\Delta M$ (0.5373) [0.2485] | 0.5766 $\Delta S_2$ (0.2646) [0.2425] | 0.4798 | .4237 |
| 3 | $\Delta Y$ | 2.4431 | 1.2508 $\Delta M$ (0.5313) [0.2608] | 0.4054 $\Delta S_3$ (0.1914) [0.2360] | 0.3241 | .4206 |

*Note:* Figures in parentheses are standard errors of respective regression coefficients, and figures in brackets are partial correlation coefficients.

*Sources:* Data for $Y$ from 1947 to 1964 were taken from *Survey of Current Business*, Aug. 1965, Table 1, pp. 24–25, Table 4, pp. 30–31, Table 5, pp. 32–33, Table 6, pp. 34–35, Table 8, pp. 36–37, Table 10, pp. 38–39; and for the period 1965–66 from current issues of the *Survey*. Data for $M$ and $S_1$ from 1947 to 1963 were taken from *Fed. Res. Bull.*, June 1964, pp. 682–92, and for the period 1964–66 from current issues of the *Bulletin*. Data for mutual savings and postal deposits from 1947 to 1960 were taken from M. Friedman and A. J. Schwartz, *A Monetary History of the United States, 1867–1960*, Princeton, 1963, pp. 718–22, and supplemented to 1966 from current issues of *Federal Reserve Bulletin*. Data for savings and loan share capital from 1947 to 1966 were obtained from the Office of Research and Home Finance, Federal Home Loan Bank Board, Washington, D.C.

posits possess significant degrees of moneyness. It can be seen from (1) that for commercial bank time deposits, $S_1$, the value of the ratio, $c/b$, equals 0.5785. This ratio decreases to 0.4798 in (2) and to 0.3241 in (3) for $S_2$ and $S_3$ concepts of savings deposits respectively. Thus the evidence shows that as we broaden the concept of savings deposits, the degree of moneyness decreases. However, we may note that all regression and partial correlation coefficients are significant at the 5 per cent level.[2]

[2] The values of the multiple and partial correlation coefficients may not seem very high, but it should be remembered that the data used in the analysis are quarterly first differences. See the discussion on this point by Friedman and Meiselman. [5, pp. 203–4.]

We may note, too, that for the Timberlake-Fortson savings deposits variable which corresponds to our $S_2$, the degree of moneyness is 0.4798.[3] They have shown that except for the 1929–39 decade (which includes their estimate for the period 1933–38) savings deposits, $S_2$, possessed negative degrees of moneyness in the prewar period. Using the same method we have shown that in the postwar period all three stocks of savings deposits possessed varying degrees of moneyness. Estimates of savings deposits $S_2$, and $S_3$, which contain the liabilities of nonmonetary intermediaries, though possess lower degrees of moneyness than $S_1$, are statistically significant. The evidence presented above substantiates the Gurley-Shaw hypothesis and is in line with the findings of Lee [6].

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## On the Economics of Wired City Television

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Let us assume that the Federal Communications Commission authorized the development of wired cities for television (WCTV), whereby programs would be carried to homes on wires, as telephone calls are. The system would eliminate television towers and broadcast transmitters, home antennas and leads, possibly a portion of the TV set, and the use of electromagnetic spectrum which the signal occupies over the city. But the new system would require a single street wire and individual drop lines to homes.

We would expect various companies, existing ones and newly formed, to apply to the local governmental authorities for a common carrier franchise to

[3] Since Timberlake and Fortson did not estimate the degree of moneyness of $S_2$ for the period covered above, it is not possible to compare results. However, they did make estimates (using annual data) for the period 1948–1960 and 1953–65 for which they found $c/b$ values of $-.3032$ and $.1521$ respectively.

wire up the cities with 20-TV channel coaxial cable. Governmental utility corporations might propose to extend their utility services already provided—electricity, telephone, transit, water, etc. Among private companies, CATV firms are already in the business of wiring up cities. So are telephone and electric companies. Gas and water companies and other firms might also be interested.

The single 20-TV channel coaxial wire carried throughout the city is the same type that CATV now uses in its 12-TV channel systems.[1] There is a drop line to each home, at the end of which is a terminal for plugging in present (and future) TV sets. TV guides are available from the WCTV company and, as now, with newspapers or by subscription from a publisher. In addition to the wire network, the common carrier system also provides as an optional service rental studios, cameras, tape recorders and players, and studio personnel. Similarly, rental switching facilities are available for receiving microwave, satellite, wire, or wave guide relays from elsewhere, and putting them onto the wired city system.

The common carrier will put any sender's signals on the wire, charging him according to published tariffs approved by the regulatory authority. Senders may lease a TV channel by the year, by the month, by the day, by the hour; or by the half hour per week, for a year; or in any other way, subject to availability and tariff. Senders could use their own studios, or they could rent studios, cameras and crews, etc. If more channels are required, they will be provided in due time, following usual common carrier procedures.

We now consider the various sources of television programs:

1. *Television stations with advertiser sponsors.* These would operate the same as present stations, except that their programs would be sent on the wire instead of over-the-air from a transmitter on a tower. Stations would have to pay an annual lease charge, but this cost would be relatively small (see below).

2. *Pay TV.* This could be provided by entertainment companies which, for a subscription fee, would provide programs. The public now buys season or series tickets for plays, concerts, and ball games; subscribes to magazines and to newspapers; etc. Presumably, some would subscribe to pay TV. An entertainment company would lease a channel from the common carrier for the appropriate period—for example, 24 hours per day, 365 days; or, say, Sunday afternoons during winter months. There could be several series—subscription A, subscription B, single programs, etc. To prevent nonsubscribers from viewing, a coding or scramble device could be used; or the common carrier, for a fee, could install a blankout device to interdict the program at the dropline; or a meter could be installed which recorded times spent viewing the pay TV channels.

3. *Politicians* would seek access to a TV channel for individual time periods. They could buy time from the commercial stations. Or other business enterprises would develop whose specialty was leasing blocks of time and retail-

ing political and other one-shot broadcasts. Or political parties could lease for periods. Or the politician could simply rent time and studio facilities directly from the common carrier. Further, his coverage could be limited to his own constituency.

4. *Educational TV (ETV)* would send programs on the wire. Preschool children would undoubtedly be offered instructional programs, as would students confined to their homes. So-called public TV would also be offered. The Carnegie Report on Public Television recommends that the United States have about 380 ETV stations (connected by intercity relays). The city could require, as a franchise condition, that one or two such channels be provided free on the common carrier's 20-channel cable; or ETV could lease the channels.

5. *Network program.* Networks could continue to operate as now through affiliated stations, which share in the network revenue received from advertisers. Or, subject to FCC rules, it would be possible for networks to lease their own channels on the wire. There would be opportunity for more networks because of the increase in local channel outlets and the lower cost to reach the audiences. Supplementing the benefits of increase in local channels and the reduction in cost to use them is the fact that intercity relay charges—and, indeed, intercontinental relay charges—will decline steeply with development of television satellites and wave guide. It is likely that a large increase in network and foreign programs would develop.

In brief, a system of wired cities would be able to provide more, and more diverse, programming than does the present system or the major alternative possibilities.

We compare the present system with the proposed new one:

| *Item* | *Present System* | *Proposed WCTV* |
| --- | --- | --- |
| Spectrum | Uses 1 TV channel per station | None |
| Transmitter and tower | Uses 1 per station | None |
| Home antenna | Uses 1 per home | None |
| Home sets | One or several per home | One or several per home; some cost saving in the chassis |
| Poles, conduits, droplines | Doesn't use for TV | One coaxial wire on pole or in conduit, plus 1 drop wire per home |

The proposed system is advantageous on the first four lines. It has a cost disadvantage on the last line. We estimate that the street cable and droplines of the wired cities would require a total capital investment figure of about $60 a home.[2] This would justify a basic common carrier toll for the 20-channel capacity equivalent to about $1 to $1.50 a month charged to either the customer, or the sender, or both parties in combination.

What are the benefits which might justify this investment cost of, say, $60 a home for wiring the city? We summarize below:

[2] This estimate is based on the experience of CATV systems; see [1, pp. 12-17] [4, pp. 23-40].

1. *Number of channels.* The initial installation of 20-TV channel coaxial wire is a very large increase in potential service. Most TV markets are now served with about three commercial and educational TV signals, and even if all the new UHF assignments were activated, the figure would average only five or less. Wired city television breaks through the present limitation on TV channels due to limited spectrum assignments for television. Alternatives such as pay TV, or a flourishing UHF system, or regulation of networks, or direct broadcasting from satellites do not escape this limit.

2. *Cost, numbers, and diversity of offerings.* The cost to carry a signal to the home would become extremely low under the WCTV proposal. At these low costs, there will be a sizeable increase in number and diversity of programs offered. A major financial barrier to entry, high marginal cost for transmission on an additional channel, would be overcome. At the low transmission costs and with open time available, minority-taste audiences could be served with the specialized TV fare they desired, either becaue they would pay for it themselves or because someone else was willing to pay in order to deliver the program or its related messages. Diversity and wider consumer choice would be provided.[3] Opportunities to watch programs with little or no advertising would develop, for those with this preference. Television time for politicians would no longer be restricted to candidates with large financial means or rich sponsors. Moreover, these favorable results for communication freedom would occur without governmental controls on programs or scrutiny of political speakers.

3. *Picture quality.* The wire system would serve uniformly excellent pictures on all channels on sets of present quality, because the signal would be stronger and interference negligible. Beyond this, there would be opportunity for vastly greater improvements in picture quality—size, resolution, definition, colors—from use of improved wire and completely redesigned and improved TV sets; these would, however, require additional costs.

4. *Cost savings for homes and broadcasters.* To offset the cost of creating the wire system, estimated at $6,000,000 for a city of 100,000 homes, there will be cost reductions to homes and broadcasters. One saving to homes would be the elimination of antennas. If we assume that all the homes have antennas for color or UHF sets, this saving is approximately equal to the entire cost of wiring the city! The fact is that an outside antenna for color TV and UHF costs as much or more per home as the cost per home of the wired city. In addition, new color sets and possibly new black and white sets for wire TV would become cheaper from eliminating the TV set elements which are related to picking up and handling the weaker, less clean, over-the-air signals. As color sets become widespread, about $30,000,000 or more of TV sets would be involved in a city of 100,000 homes. The cost saving on these might be half as much as the $6,000,000 cost of wiring the city, or possibly as much as that cost. There would be, in addition, savings in annual maintenance charges due to the elimination of these set elements. Finally, stations would save the

[3] For the view that an increase in the number of signals leads to an increase in diversity, see [1, pp. 1-3] [5].

$100,000 to $200,000 per year which they pay for capital and operating charges on a tower and transmitter.

In summary, capital savings to offset the $6,000,000 capital cost of wiring a city of 100,000 homes are considerable:

|  | Savings in Capital Cost |
|---|---|
| Home antennas for color sets, at $60 per home | $6,000,000 |
| Home sets, saving of 20 per cent on 50,000 color sets, at $300 each | 3,000,000 |
| Transmitters and towers, about $500,000 each channel | ? |

5. *Spectrum saving.* It is generally believed that there is a shortage of spectrum. Television now utilizes a very large fraction of the spectrum, in the best frequencies. Wire television could permit some of the spectrum now allocated to TV to be assigned to other valuable purposes, such as for public safety, use by land and marine mobiles, in satellite relays, etc.

6. *Flexibility.* Finally, the wired city provides flexibility for further communication innovations. The initial coaxial wire can provide extra channels, which could be made available at nil or nominal charge to sponsor innovations. These could lead ultimately, to shopping services; credit purchases; facsimile mail; data processing, bookkeeping, and reference services; etc. A wire system is, of course, indefinitely expandable.

We conclude by considering a few objections and obstacles to the introduction of a wired-city television system. First is the problem of service to rural areas, where wiring may be very expensive per home. In such places it may be necessary to continue to use an over-the-air system, but more accurate cost estimates, new or improved technology, translators, or some form of subsidy might allow rural areas full benefits of a wired system. Second, in very large, densely populated areas, such as New York City, broadcasting over-the-air is a cheaper means of transmission than wire up to the limit of available spectrum. This comparison may mislead, however, because over-the-air transmission: (i) gives lesser picture quality, (ii) utilizes scarce spectrum space, and (iii) requires relatively greater consumer investment. Third is the problem of programming costs, which some believe may be so high as to prevent utilization of a 20-channel system. We differ. With a large number of channels the opportunity costs of repeating programs a few times a week would be much lowered, thus permitting lower costs and increasing the public's effective choice. As it becomes possible to reach more specialized tastes, then local, regional, and foreign talent and programs will be utilized which are not in great demand now or even used at all, and therefore do not command high unit prices. Compare, for example, magazines, books, and the diversity of types and levels of theater. Inexpensive, service type programming will appear—weather reports, city council meetings, stock market reports, community affairs, and news tickers—when the opportunity cost of channel use declines. As many channels of programs will become available as there is willingness to pay; and the marginal costs can be exceedingly low.

Finally there are the political realities. The networks and stations have extremely desirable oligopoly positions at present. They have numerous financial and political allies in the Congress. Stations are closely associated with major newspapers. Other communications media, including motion picture exhibitors, who previously led a successful attack on pay-TV in California, might experience audience loss from improvement in volume, diversity, and picture quality of TV. Other obstacles could be mentioned. Yet the promise and potentials of wired city television and other wired city services are so extraordinary that ultimately we may have them.

<div align="right">H. J. BARNETT AND E. GREENBERG*</div>

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# The Contribution of Education to the Quality of Labor 1929-1963

Greater education of labor, E. F. Denison has estimated, increased output per man-hour in the United States between 1929 and 1957 by one-third. Denison ascribes over three-fifths of the growth in output per man-hour to increased education [1, p. 148], and largely because of this estimate he is able to keep the unexplained residual in the growth of man-hour productivity down to a little more than one-half. This paper presents an estimate of education's contribution to the increase in labor productivity between 1929 and 1963 that is far below Denison's. The major source of the difference is in the measurement of the effect of education on earnings, which is the index of the quality of labor. The other, much less important, source of disagreement between the estimates is in the measurement of the change in the level of education over the years.

## I. *The Procedure for Estimation*

Measurements of the quality of labor that rely on socio-demographic characteristics, including Denison's, employ an index similar to the one described by the following formula:

$$L_t/L_0 = \frac{a \sum_i n_{it}w_i}{\sum_i n_{i0}w_i}$$

where

$n_i$ = number of workers in socio-demographic group $i$,
$w_i$ = average earnings of members of group $i$,
$a$ = adjustment factor for ability, and
$t$ and $o$ are time subscripts.

My estimate relies on measurements which differ from those underlying Denison's. To measure $w_i$, I use average hourly earnings of employed persons cross-classified by age, sex, and years of schooling, and the sample excludes agricultural workers, the unemployed, and those not in the labor force. Denison's estimate of education's contribution is based on average annual incomes of all males between the ages of 25 and 64 years classified by years of schooling [1, p. 67]. In addition, I give additional days per year of schooling less credit than the same number of days represented by additional school years. Denison, on the other hand, measures education in units of school days [1, p. 71].

My assumption concerning the effect of ability on education differentials in earnings is the same as Denison's. He proposed that 40 per cent of any education differential in earnings be assigned to ability [1, p. 73], and I have accordingly set $a$ equal to .6.

## II. *The Estimate*

The values of $w_i$ in the formula for $L_t/L_0$ are average hourly earnings of nonagricultural employed persons in 1959 classified by age, sex, and education (Table 1), which V. R. Fuchs derived from the 1/1,000 sample of the 1960 Censuses of Population and Housing. The Census data on hours were for a week in 1960, the earnings data were for the entire year 1959, and the number of weeks worked in 1959 was reported. The number of hours worked during the week in 1960 was used as an estimate of average weekly hours in 1959, and this estimate times the number of weeks worked in 1959 yielded the estimated total annual hours in 1959. The ratio of annual earnings to annual hours was the estimate of average hourly earnings. The estimate was based on a sample which excluded persons reporting no earnings in 1959, and persons reporting no hours worked in the week in 1960 for which the hours data were obtained. The sample also excluded agricultural workers because their total earnings tend to be underestimated. Income in kind is a large fraction of total earnings and the importance of self-employment

TABLE 1—AVERAGE HOURLY EARNINGS OF EMPLOYED PERSONS IN NONAGRICULTURAL
INDUSTRIES BY SEX, AGE, AND YEARS OF SCHOOLING BASED ON ANNUAL
EARNINGS IN 1959 AND HOURS DURING A WEEK IN 1960

| Age | Years of Schooling | | | | | | Total |
|-----|------|------|------|------|-------|------|-------|
|     | 0–4 | 5–8 | 9–11 | 12 | 13–15 | 16+ |       |
| *Males* | | | | | | | |
| 14–19 | 0.92 | 1.46 | 1.42 | 1.38 | 1.63 | — | 1.41 |
| 20–24 | 1.42 | 1.58 | 1.72 | 1.87 | 2.05 | 2.26 | 1.84 |
| 25–34 | 1.63 | 2.11 | 2.36 | 2.53 | 2.75 | 3.26 | 2.56 |
| 35–44 | 1.81 | 2.36 | 2.71 | 2.99 | 3.45 | 4.66 | 3.04 |
| 45–54 | 1.82 | 2.47 | 2.74 | 3.13 | 3.99 | 5.29 | 3.09 |
| 55–64 | 1.91 | 2.47 | 2.88 | 3.30 | 4.13 | 5.10 | 2.96 |
| 65+ | 1.83 | 2.22 | 2.76 | 3.60 | 3.58 | 5.08 | 2.83 |
| Total | 1.80 | 2.32 | 2.52 | 2.74 | 3.28 | 4.27 | 2.79 |
| *Females* | | | | | | | |
| 14–19 | 1.14 | 1.29 | 1.48 | 1.28 | 1.31 | 0.74 | 1.34 |
| 20–24 | 1.25 | 1.04 | 1.37 | 1.53 | 1.64 | 2.12 | 1.54 |
| 25–34 | 1.27 | 1.27 | 1.55 | 1.73 | 1.95 | 2.53 | 1.74 |
| 35–44 | 1.16 | 1.33 | 1.52 | 1.81 | 2.06 | 2.76 | 1.74 |
| 45–54 | 0.94 | 1.34 | 1.59 | 1.81 | 2.19 | 3.00 | 1.77 |
| 55–64 | 1.15 | 1.41 | 1.51 | 1.86 | 2.24 | 3.05 | 1.75 |
| 65+ | 1.06 | 1.13 | 1.50 | 1.81 | 1.59 | 2.66 | 1.49 |
| Total | 1.09 | 1.32 | 1.53 | 1.72 | 1.99 | 2.75 | 1.70 |

*Source:* V. R. Fuchs, [2, Table A-1, based on *U. S. Censuses of Population and Housing: 1960*, 1/1,000 Sample]. The sample includes all persons who were at work in nonagricultural industries during the Census week (early April) in 1960, and reported some earnings in 1959. Persons with a job but not at work in the Census week were excluded because no estimate could be made of their weekly hours. Actual average hourly earnings in 1959 were estimated from annual earnings in 1959 divided by number of weeks worked in 1959 and number of hours worked in the Census week of 1960.

also contributes to error. Since the error is to understate earnings, and both average earnings and education level are low, an estimate based on earnings of all employed persons would exaggerate the gains from education.

Data on years of schooling were provided by the Census of Population for 1940 for the experienced labor force, including unemployed persons, but excluding workers employed on public emergency projects. The estimated change in educational level relies on a comparison between the experienced labor force in 1940 and employed persons in 1960. The change in the definition of labor exaggerates the increase, since unemployed persons on the average have less education than employed persons. Table 2 compares the distributions of persons by years of schooling in the two years.

The first step was to obtain an estimate of the increase in quality per worker attributable to education measured in years of schooling. Between 1940 and 1960 the increase in the number of school years improved the quality of labor by 4.0 per cent. An assumption that the rate of change was uniform over the entire period 1929 to 1963 results in an estimated gain of 6.8 per cent.

Since the average number of days per school year completed by workers increased by approximately the same percentage as the number of school years, the index of improvement in quality due to education·measured in school days is the square of the index based on school years, or 1.068.[2] This results in an estimated improvement of 14.1 per cent. The gain in quality thus is between 6.8 per cent and 14.1 per cent depending upon the importance attached to the number of days per school year. I will assume that an additional day of schooling is equivalent to 70 per cent of any day included in an additional year. This assumption yields an estimated improvement in

TABLE 2—PERCENTAGE DISTRIBUTION BY YEARS OF SCHOOLING OF THE EXPERIENCED LABOR FORCE IN 1940 AND OF EMPLOYED PERSONS IN 1960

| Years of Schooling | 1940 | | 1960 | |
|---|---|---|---|---|
| | Males | Females | Males | Females |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| 0–4 | 11.8 | 7.4 | 5.9 | 3.5 |
| 5–6 | 10.3 | 7.3 | 12.3 | 8.9 |
| 7–8 | 33.4 | 24.5 | 15.8 | 12.7 |
| 9–11 | 17.1 | 17.8 | 22.2 | 22.5 |
| 12 | 16.2 | 27.6 | 24.4 | 33.3 |
| 13–15 | 5.5 | 8.7 | 9.6 | 11.1 |
| 16+ | 5.7 | 6.7 | 9.7 | 7.9 |

*Source:* 1940: *Sixteenth Census of the U.S.: 1940*, Population The Labor Force (Sample Statistics), Occupational Characteristics, Table 3. 1960: *U.S. Census of Population: 1960*, Occupational Characteristics, Table 9.

quality of 11.9 per cent, which is equivalent to an average annual rate of increase of .3 per cent.

### III. *Comparison with Denison's Estimate*

Denison's estimate of the contribution of education to the increase in quality of labor between 1930 and 1960 is 32.6 per cent, which is much higher than even my upper-limit estimate for 1929–1963. The disagreement arises chiefly in the measurement of earnings by years of schooling. A list of the differences and their consequences follows:

1. As Table 2 reports, the shift in the distribution of workers by years of schooling was largely within the interval 8 to 12 years of schooling. A substantial part of the total improvement of the quality of labor consisted of the change in quality represented by the increase in schooling within that range. Denison's estimate is based on Houthakker's estimates of average annual income in 1959 of males between the ages of 25 and 64 years by years of schooling, which indicate an increase of 40 per cent in income with an increase in schooling from 8 to 12 years [3, p. 25]. If we look at Table 1, we can see that average hourly earnings among all males in the sample for the present study increased by a much smaller percentage over the closest corre-

sponding education interval. The increase in average hourly earnings be-
tween 5–8 years of schooling, the average of which is 7 years, and 12 years
was only 18 per cent.

I use average hourly earnings rather than annual earnings because the
index is designed to measure the quality of labor rather than the quantity:
The effect of variation of annual hours on earnings should be eliminated. As
we can see in Table 3, education is associated with hours of work. Among the
restricted group of males between ages 25 and 64 the average annual hours
of the group with 12 years of schooling exceeded that of the group with 5–8
years by 9 per cent. This table understates the effect of annual hours on
earnings in Houthakker's estimates, because it is based on a sample which
excluded those persons who reported no hours in the Census week of 1960 or

TABLE 3.—AVERAGE ANNUAL HOURS BY YEARS OF SCHOOLING AMONG EMPLOYED PERSONS
IN NONAGRICULTURAL INDUSTRIES BASED ON HOURS IN A WEEK IN
1960 AND WEEKS WORKED IN 1959

| Years of Schooling | All Men | Men Age Group 25–64 | Women |
|---|---|---|---|
| 0–4 | 1,824 | 1,862 | 1,471 |
| 5–8 | 1,924 | 2,001 | 1,493 |
| 9–11 | 1,924 | 2,107 | 1,446 |
| 12 | 2,102 | 2,186 | 1,601 |
| 13–15 | 2,063 | 2,194 | 1,512 |
| 16+ | 2,182 | 2,229 | 1,530 |

*Source: U.S. Census of Population and Housing: 1960,* 1/1,000 Sample. See note to Table 1.

no earnings in 1959, and Houthakker's estimates are for all males. The use of
average hourly earnings as an index of quality leads to a smaller estimate of
the increase in quality due to the increase in education than an index based
on annual income.

Annual earnings may be more acceptable as a measure of the effective
quantity of labor per man weighted by quality than as a measure of quality
alone. If the purpose of the estimate is to quantify the sources of growth of
total output rather than the sources of growth of output per man-hour, it
may be desirable to use annual earnings to measure the effective quantity of
labor per man weighted by quality. This approach assumes that the ob-
served relation between weekly hours and years of schooling is stable and
persistent. The relation would have to be explained by personal character-
istics rather than by the irregularity of work arising from instability of de-
mand or other job characteristics. In any case, growth in the quantity of
labor due to greater education should not be counted twice. If there has
been an increase in weekly hours from this source, then it is reflected in the
estimated change in average weekly hours which is part of the measurement
of the change in the quantity of labor.

2. The exclusion of persons reporting zero hours in the Census week of 1960 or zero earnings in 1959 reduces the effect of education. The purpose here again is to measure the association between the quality of labor per man-hour and education, rather than between the quantity of labor per man weighted by quality and education. Denison's estimate is based on average annual income of all males including those who were unemployed or out of the labor force. This estimate reflects the view that the incidence of unemployment among education groups is due to differences in personal characteristics rather than the level of demand.

3. The greatest increase in education has been among young persons. The present estimate is based on a measurement of the increase in education by age and sex. Education differentials in earnings increase with age. Denison's estimate of the increase in quality due to education did not control for age.

4. Denison used Houthakker's estimates of income by education groups which were for all workers including agricultural labor. The present estimates, as we have seen, are based on a sample which excludes such labor.

5. Houthakker did not exclude property income from income; he measured the association between education and total income. The present estimates are based on earnings.

The disparity between the two estimates is due also to the difference in the treatment of additional days per school year. The average number of school days per year increased both because of better attendance and the lengthening of the school year. Denison assumes that an additional school year represents no greater improvement in work skills than an equal number of additional days scattered throughout an entire schooling. No argument is presented in behalf of the assumption. Some of the additional time appears to be devoted to the study of the arts and humanities, which results in the cultivation of leisure skills rather than work skills. This is the principal reason for my decision to treat additional days per school year as equivalent to 70 per cent of the same number of days in additional years.

The choice of the school day as the unit of education influences Denison's result considerably. His estimate of the effect of additional school years on average earnings between 1930 and 1960 is 14.2 per cent. The use of the school day as the unit leads him to multiply the increase of 14.2 per cent by a factor measuring the proportional increase in the total number of school days, which yields the result of an improvement of 32.6 per cent.

The effect of varying the assumption on my estimate is much smaller because the estimate of the increment in earnings resulting from an additional year of schooling is much smaller than Denison's. Giving additional days per year full credit produces an estimate of improvement in quality due to education of 14.1 per cent; my assumption results in a figure of 11.9 per cent; not giving any credit for additional days reduces it to 6.8 percent. It is not unreasonable that the increase in the number of days per school year has contributed insignificantly to the development of work skills. Thus age may have some bearing on learning ability. The study of the relation between schooling and work skills still is in a primitive stage. The range of the esti-

mates corresponding to the extreme assumptions is considerable and calls for further study.

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# The Myth of Absolute Advantage: Comment

A recent communication by Professor Brandis, "The Myth of Absolute Advantage" [1], claims that Ricardo's concept of absolute advantage" is inconsistent with his own assumptions. Brandis argues that Ricardo supposes by arithmetic example that an "absolute advantage" country produces a pair of goods with the aid of two factors, capital and labor, more productively than does its trading partner. But Ricardo also states that, if capital and labor were mobile, then both factors would not only move to the "absolute advantage" country but would produce in the new environment with "absolute advantage" performance. Brandis points out that this implies that the productivity advantage cannot be ascribed to the quality of the two factors in the example but must be ascribed to the intercession of another factor. Brandis adds correctly that the only factor which could explain this productivity advantage and which conforms to Ricardo's framework is resource endowment or "land." But then Brandis concludes that this uncovers an inconsistency in Ricardo's reasoning since reference to land as a third factor is precluded because "in Ricardo's thought rent was not a price-determining factor" [1, p. 170].

This is an erroneous conclusion. Ricardo eliminates the natural resource, land—with its variations in productivity due to differences in soil fertility and

other qualities—as a price determinant only in the case of a closed economy with perfect factor mobility. It is only possible here for market price to be determined at the margin where no rent component enters price because it is only here that capital (and labor) can move freely from one employment to another in pursuit of profit (and labor income) maximization. But since Ricardo postulates immobility of capital between countries, he carefully qualifies his core model and introduces his special case of trade between countries with the following statement: "The same rule which regulates the relative value of commodities in one country does not regulate the relative value of the commodities exchanged between two or more countries" [3, p. 81].

Once this qualification is taken into account, the supposed inconsistency in Ricardo's analysis vanishes—Brandis' "mysterious" third factor turns out to be the obvious one, land. Furthermore, Ricardo operates with a long-run price determinant and numeraire (labor time)—imperfect as the latter is by his own admission—which is exogenous to the price system. On the basis of such a standard, it is of course by no means a myth that absolute advantage based on economic resource endowment can exist and can be demonstrated. So Ricardo may rest in peace in regard to the issue raised by Brandis.

A mystery, however, which still remains to be cleared up is why Ricardo bothered with absolute advantage in the first place when this is such an unimportant case. The explanation probably is that he wished to defend free commerce between countries as being advantageous to both sides in the least obvious case—the one in which one country is less productive in all tradeable consumer goods and hence appears to have nothing to offer the other country. But once he had committed himself to such an extreme-case argument, he realized that his core analysis based on free competition and free mobility of all movable factors and commodities would lead to a solution inimical to his defense of free commerce.

Thus, immediately after presenting his famous Portugal-England wine-corn example, he makes the acknowledgment, which misled Brandis:

> It would undoubtedly be advantageous to the capitalists of England, and to the consumers in both countries, that under such circumstances the wine and the cloth should both be made in Portugal, and therefore that the capital and labour of England employed in making cloth should be removed to Portugal for that purpose [3, p. 83].

It is true that Ricardo does not go on to specify that this flight of capital and labor would be detrimental to England and its remaining population as a whole. But there can be little doubt that he must have realized this implication since, given diminishing returns on land, the magnitude of domestic capital endowment was perhaps the most important variable determining national material welfare for him and for the other classical economists. Thus, Ricardo painted himself into a corner. It was probably in order to save his "extreme case" argument for free international commerce that he was led to add to his foreign trade model the postulate of immobility of capital between countries.[1]

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[1] It should be very clear at this point that the transfer of capital from a country meant

It is on this score that Ricardo deserves to be criticized, especially since this assumption may well have had an inhibitory influence on the development of international trade theory. Further, it clashed with Adam Smith's views, which after all represented conventional theory in Ricardo's times,[2] it contradicted his own assumption of international capital mobility when he was arguing against slowing down the introduction of machinery in the same work,[3] and it certainly was not then or now borne out by empirical evidence. One might even conclude with Parson Malthus, though this would not be fashionable in this age of formal analysis, that economics may have been better off had Ricardo been a little less cavalier and more realistic in his assumptions even at the cost of being a little less rigorous in his logic [2, pp. 4-6].

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## The Myth of Absolute Advantage: Comment

In a recent note in this *Review* [2], Professor Royall Brandis argued that the concept of "absolute advantage" is a myth, a logical impossibility that should be discarded. I shall argue that Brandis has overstated his case, and that in some contexts the concept remains valid and useful.

I agree with Brandis that absolute advantage cannot exist under the strict assumptions of the Hecksher-Ohlin, or factor proportions, theory of international trade. This theory requires the assumptions that production functions are linear, homogeneous, and identical in the two countries, that the produc-

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for Ricardo the actual removal from a country of "food, clothing, tools, raw materials, machinery" . . . "which (are) employed in production" [3, p. 53]. This raises some sticky problems of comparability between Ricardo's and our contemporary conceptualization and analysis—but these will not be discussed here.

² It was of moment to Smith's analytical preference for agriculture that the capital of manufacturers and merchants, which is not fixed in agriculture, is internationally footloose. Thus, Smith writes, "The capital, however, that is acquired to any country by commerce and manufactureres, is all a very precarious and uncertain possession . . . A merchant . . . is not necessarily the citizen of any particular country . . . a very trifling disgust will make him remove his capital, and together with it all the industry which it supports, from one country to another" [4, p. 395], also see [4, pp. 345, 880].

³ "The employment of machinery could never be safely discouraged in a state, for if a capital is not allowed to get the greatest net revenue that the use of machinery will afford here, it will be carried abroad . . ." [3, p. 271].

tion functions are such that at any given factor-price ratio commodity $X$ requires a higher proportion of capital to labor than does commodity $Y$,[1] that factors are perfectly mobile within (and immobile between) countries, and that perfect competition exists in both countries. Given these assumptions, it follows in the two-factor, two-commodity case that nothing remains on the *supply* side except the relative endowment of the two factors ($C$ and $L$) to provide a basis for differences in pre-trade price ratios in the two countries. It also follows that the country with a relative abundance of capital will have a comparative advantage in $X$.[2] This country (call it A) produces both commodities with more capital, but less labor, than does B in the pre-trade situation. Therefore, we cannot say that either country has an absolute advantage unless we wish to make comparisons in terms of a single factor. This is Brandis' point, and thus far I agree with him. (I would add that I believe international economists are generally in agreement on this point, and that no one speaks of absolute advantage in the Hecksher-Ohlin context, except perhaps as a slip of the tongue.)

Brandis' conclusion that absolute advantage should be expunged from the economist's vocabulary seems to stem from his complete acceptance of the Hecksher-Ohlin theory, especially the assumption that production functions are identical. He notes that Ricardo, in his England-Portugal example, does not explain *why* Portuguese labor and capital are more productive in both industries, ". . . and the explanation of why he does not . . . is because there is no reason" [2, p. 170]. In another place he says that those models which assume that the same quantities of inputs produce different quantities of output in the two locations ". . . contain the curious error of assuming that a production function knows where it is and acts differently in different locations" [2, p. 171].

Now, Brandis may be correct in his belief that production functions are everywhere identical, but we must recognize that in the present state of knowledge this is no more than a hypothesis, and that other hypotheses are at least possible. For their part, classical economists were unworried by the fact that their analysis relied upon unexplained differences in productivity in the two countries. As Caves has said, they thought the assumption "that X units of labor might produce different quantities of the same product in different countries was a 'realistic' assumption seldom felt to call for systematic defense or elaboration" [3, p. 10]. The Ricardian example clearly implies the following (different) production functions in the two countries:

| England | Portugal |
|---|---|
| Cloth: $C = 1/100\ L$ | $C = 1/90\ L$ |
| Wine: $W = 1/120\ L$ | $W = 1/100\ L$ |

This assumption is evidently unacceptable to Brandis, but he has no right to

[1] This assumption is not strictly necessary to prove that absolute advantage cannot exist. Its purpose is to make certain that each country has a comparative advantage in that commodity which requires relatively much of its abundant factor.

[2] A qualification is needed to prevent differences in demand patterns in the two countries from swamping the effect of differing relative factor endowments.

reject it a priori. Indeed, recent work by Minhas and others [1] [5] has cast doubt on the assumption of identical production functions. In models containing the assumption of different production functions, one example of which is the Ricardian model given above, absolute advantage still has a clear, definite meaning. If Brandis would have us renounce such models, and thus eliminate the possibility of absolute advantage, then he must offer *proof* that production functions are identical.

Brandis' faith in identical production functions leads him to argue that examples containing differential productivities should be corrected by redefining the units in which factors of production are measured in order to make the outputs come out right. In dealing with a "two-resource case" from a popular study guide, Brandis says that, if units of capital and labor mean the same thing in area A as in area B, then a given amount of capital and labor would produce the same output in the two areas. "The only other way out is to say that a 'unit of capital' in area B is not the same thing as a 'unit of capital' in area A and similarly for a 'unit of labor' " [2, p. 172]. This comment is reminiscent of Leontief's suggestion that his paradoxical result for U.S. trade could be made consistent with factor-proportions theory by multiplying the U.S. labor force by a number large enough to make the United States a "labor abundant" country vis-à-vis the rest of the world [4]—a suggestion that appeared to convert theory into tautology. If all differentials in factor productivity are removed by redefining units of the factors, the theory becomes empirically empty.

Another aspect of this issue is a basic one, involving the relationship between the definitions of "production function" and "factor of production." When we drop the convenient assumption of two homogeneous factors of production and confront the complexities of reality, it becomes difficult to list all the factors of production and to define them unambiguously. Those who wish to retain the assumption of identical production functions can resort to an ever finer classification of the factors to account for observed differences in output from given inputs, while those who assume that production functions are different can work with fewer factors and broader categories. For example, if production of a ton of oranges requires $h$ labor and $k$ capital in Florida, and $3h$ labor and $20k$ capital in Maine, one may argue either (a) that climate is one dimension of the production function, that Maine possesses little or none of the requisite climatic factor of production, and that it must therefore use larger amounts of capital and labor to make up for its climatic deficiency, or (b) that production functions are different in the two regions because of the different climates and that Florida has an absolute advantage in terms of the factors actually included in the production function. Similarly, because of special qualities of its soil, if Brazil can produce twice as much coffee as Argentina can with the same quantities of land, labor, and capital, one can either consider production functions to be different, or one can treat the various types of soil as different factors of production, in which case Brazil's greater output can be attributed to her greater input of the type of soil best suited to coffee-growing. As Robinson has said:

> No matter how unlike the production environments of two countries happen to be, they can be considered as sharing a common production function if that function is given a sufficiently large number of dimensions. The concept of a "factor" must then, of course, bear a heavier burden; and it may become more difficult to compare factor supplies so as to speak meaningfully of "relative endowments" [7, p. 172-73].

In view of the difficulties in measuring factor inputs, it seems likely that, in any empirical studies that will be feasible in the foreseeable future, factors must be defined in such a way that the existence of absolute advantage will remain a definite possibility.

In his Section VI ("The Source of the Error"), Brandis shows that examples of absolute advantages turn out to be examples of comparative advantage when converted into opportunity cost ratios in each country. He regards this fact as further proof of the nonexistence of absolute advantage, perhaps because he thinks that absolute and comparative advantage are "mutually exclusive cases" [2, p. 174]. This is indeed a curious error. Ever since Ricardo, economists have recognized that all trade is based on comparative advantage, and that a case of comparative advantage *may* also be a case of absolute advantage. If we *assume* Ricardo's (different) production functions in England and Portugal, Portugal has an absolute advantage in both commodities but *also* a comparative advantage in one of them (wine) because the opportunity cost ratios are different: $C = 5/6 \, W$ in England, $C = 9/10 \, W$ in Portugal. Brandis' implication, that such conversion of absolute advantage examples into relative price differences in the two countries is evidence that absolute advantage is impossible, is simply wrong.

The concept of absolute advantage has great heuristic value in showing the advantage of specialization in such homely examples as the engineer who is a better draftsman than his clerk but who maximizes income by specializing in engineering. One can hardly improve on Ricardo's own example:

> Two men can both make shoes and hats, and one is superior to the other in both employments, but in making hats he can only exceed his competitor by one-fifth or 20 per cent, and in making shoes he can excell him by one-third or 33 per cent;—will it not be for the interest of both that the superior man should employ himself exclusively in making shoes, and the inferior man in making hats? [6, p. 83n]

Since Brandis proposes to eliminate absolute advantage from the economist's vocabulary, I wonder how he would deal with this case. Of course, interpersonal differences in productivity may result from differences in education, and one might treat a man as a package of capital and labor, with the proportions differing from one man to another. However, we may produce examples in which productivity differs even when education and other such variables appear to be equal, at least as far as measurement can take us. Are we then to say that Mr. A has more innate ability than Mr. B, and treat this ephemeral quality as a factor of production of which A uses more than B, thus negating absolute advantage? If so, we are back to tautology. If not, then absolute advantage still exists; and if it can exist for two individuals, it is at least con-

ceivable that one region's population may be composed of people like Mr. A, and another's of people like Mr. B, so that interregional absolute advantage must also be admitted.

The other great heuristic value of absolute advantage is that it helps us to show that trade is beneficial to both countries *even if* one country can produce both goods more efficiently (i.e., with less of every resource) than another. Indeed, it should be noted that the only reason we need to use the term *comparative* advantage is the existence of absolute advantage. The adjective, comparative, was introduced to show that, even if A has an absolute advantage (or disadvantage) in both goods, it can still gain from trade if its advantage in one good is larger than in the other—i.e., if relative prices differ in the two regions prior to trade. In the pure Hecksher-Ohlin case, where absolute advantage cannot exist, there is no reason for any adjective. A country simply has an advantage in one good, a disadvantage in the other.

I conclude that it is futile to search for absolute truth about absolute advantage, and premature to speak of discarding it as a myth. Whether or not the concept is useful and meaningful depends on the context.

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## The Myth of Absolute Advantage: Reply

Professor Anspach argues that Ricardo really had a third productive resource, Land, in mind when he presented his exposition of absolute advantage. If he is correct in this interpretation (which can only be derived by inference since Ricardo certainly did not say so), then Ricardo's example of absolute advantage becomes nothing more than a case in which the resource endowments (including Land) of England and Portugal are such that England has a

comparative advantage in the production of cloth, Portugal in the production of wine. If this be so, the notion of absolute advantage should never have entered the literature of economics in the first place. We are then left with the puzzle of why a piece of political propaganda on Ricardo's part became a permanent fixture in the literature of international trade theory.

I think Anspach may be closer to the true explanation with his second suggestion that Ricardo believed that in labor time he had found a measure of value which was exogenous to the price system. For it does appear that Ricardo, unlike many who came after him, realized that no absolute standard of value could be found *within* the economic system. What he did not realize was that a standard exogenous to the system was irrelevant for economic analysis. Nor did he see that an absolute standard was not even necessary since economic theory is concerned only with *relations*.

Professor Ingram's criticisms involve both theoretical and empirical considerations and the two can best be discussed separately. Little need be said about the empirical questions since my original note was not concerned with them. The difficulty (if not impossibility) of finding the precise real-world counterparts of the constructs of a theoretical model is a commonplace in economics (and, indeed, in any other scientific discipline). No one supposes the "national income" of macrotheory to be the same thing as the "national income" of the natural accounts. But one cannot sustain an attack on the logic of the theory by pointing this out or require the theorist to furnish empirical proof that they are identical—as Ingram would have me do with production functions. The relation between theoretical model and real world is an epistemological question and was not the question raised in my note which was a more modest question of logic.

The stance on theory which Ingram takes reflects a different problem—the refusal of some economists to accept the fact that only relative economic concepts have meaning in any scientifically acceptable sense. The price of a product or of a productive resource is a relative price whether measured in money terms or real terms. For this reason, to describe anything as being "cheaper" is to describe something else as being more expensive. And it is elementary logic that, thus, everything cannot be "cheaper."[1] In like fashion, the use of the term "more efficient" can only mean, in economics, lower cost of production and, in turn, this has meaning only if related implicitly or explicitly to something else which is "less efficient" or higher cost. I would hazard the guess that Ricardo did not see the nature of his problem because he believed his labor theory of value provided an absolute standard of measurement of value.

The lawyer-typist, engineer-draftsman, shoemaker-hatmaker examples of absolute advantage always contain a word like "better" (Ingram) or "superior" (Ricardo) which implies some absolute standard of measurement which cannot be *economically* relevant as a basis for trade. The Ricardian shoemaker-hatmaker example cited by Ingram tells us only that the "superior" individual will have a higher income than the "inferior" individual whether he makes

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[1] J. S. Mill [1, p. 540-41] saw this point clearly a century ago in his analysis of value, but that is not to say that he was consistent in applying it throughout his system of thought.

shoes or hats. But the "superior" individual cannot make *both* shoes and hats more cheaply (in any meaningful economic sense) than the less productive individual. Only the most naive labor theory of value would hold otherwise. However, I would not deny that the labor theory of value has hung on in expositions of international trade theory long after it has been discarded elsewhere in the discipline. Perhaps this is the price we pay for our fascination with the notion of absolute advantage. I would deny the heuristic value of any model, homely or otherwise, which violates the most elementary rules of logic and the most basic assumptions of economics. Our inheritance from the past of a felt need to have an absolute standard of measurement is something we should try to free ourselves from rather than defend. And when books have passed through several editions I doubt that the logical errors which remain deserve to be excused as "slips of the tongue."

Some writers treat absolute advantage and comparative advantage as mutually exclusive cases. Some treat absolute advantage as a subdivision of the general case of comparative advantage. In the latter treatment, as far as I know, the residue (that part which is *not* in the absolute advantage category) is unnamed or called "comparative advantage" also. In fact, these categories have no bearing on the basis for trade. Rather, the two cases are the one in which we can determine which nation has the higher per worker or per capita income (the "absolute advantage" case) and the case in which the higher per worker or per capita income nation cannot be determined (the "residue").[2] But this has nothing to do with the *basis for trade* which purports to be the subject of discussion in all the treatments of absolute advantage.

I would close by saying that my attack on the concept of absolute advantage does not spring from ". . . complete acceptance of the Hecksher-Ohlin theory . . ." (Ingram). It springs rather from my belief that illogic and irrelevance have no place in economic theory.

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[2] For example, in Ricardo's classic case of absolute advantage, we see immediately that per worker real income is higher in Portugal than England. If we change the figures slightly so as to have a case of comparative advantage (or the "residue" of the general case of comparative advantage if that terminology is preferred) we might have the following:

|  | England | Portugal |
|---|---|---|
| Cloth (equal quantity) | 90 man-years | 100 man-years |
| Wine (equal quantity) | 120 man-years | 80 man-years |

With only this information, we cannot determine which nation has the higher per worker real income, but we can determine the basis for trade.

Again, we might present a model in which the nation with the higher per worker real income is readily apparent, but in which there is no basis for trade. Such a model would be the following:

## On the Theory of Optimum Externality: Comment

While acknowledging the ingenuity of Dolbear's diagrammatic construction [1], a "general" model of a two-person economy that produces in effect one good and one "bad" in fixed proportions appears to yield no conclusion that could not be drawn more simply from a partial analysis—at least, one wherein we permit ourselves the convenience of using money as a yardstick and wherein we use a Figure having marginal curves instead of indifference and transformation curves. The treatment presented here enables us to elaborate in a more familiar way the arguments leading to his first conclusion: (1) that the optimal output produced will depend upon the extent of legal responsibility. In addition, it simplifies the critical examina-
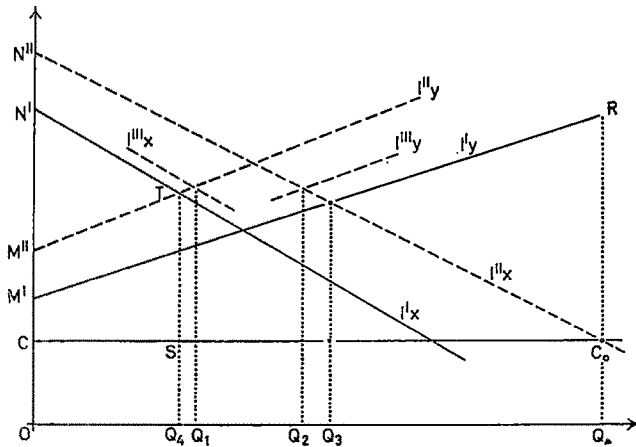


FIGURE 1

tion of three other conclusions (in my order); (2) that it is not in general possible to impose a constant per unit tax that both achieves an optimal output and compensates exactly for damages; (3) that some of the standard tax proposals will not in general establish an optimal output; and (4) that it is not simple "to regulate externality" with tax schemes.

Along the horizontal axis of Figure 1 we measure units of heat and smoke, these being produced in fixed proportions.[1] Along the vertical axis we measure for $X$ (assumed provisionally to be affected only by heat) the marginal value of successive units of heat and, for $Y$ (assumed provisionally to be affected only by smoke), the marginal value of compensation required for

| | England | Portugal |
|---|---|---|
| Cloth (equal quantity) | 90 man-years | 60 man-years |
| Wine (equal quantity) | 120 man-years | 80 man-years |

Portugal clearly has the higher per worker real income. It is equally clear that there is no basis for trade between the two nations.

[1] I adopt Dolbear's assumption of fixed proportions which is not, however, essential in the treatment proposed here. Whatever the amounts of smoke associated with successive units of heat production, they entail compensatory payments that have to be subtracted from the marginal valuation of heat.

successive units of smoke. $OC$ measures the constant per unit cost of heat. Any point along $X$'s marginal indifference curve[2] $N'-I'_x$ is consistent with $X$'s welfare prior to any heat being available at all. Thus, $X$ would pay a maximum of $ON'$ for a first unit of heat, the vertical height of the $N'-I'_x$ curve indicating the maximum payments $X$ would make for successive units of heat which, if paid, make him no better off than he is without heat. If, however, $X$ were permitted to buy heat freely at cost $OC$, he would make a consumer's surplus of $CN'$ on the first unit, an addition to his welfare that would raise his marginal indifference curve—assuming a positive welfare effect—and would, therefore, raise the maximum amounts he would pay for all successive units. A consumer's surplus on his second unit would further raise his welfare and therefore his marginal indifference curve, and so on for all successive units until he was in equilibrium buying $OQ_0$ units of heat, at which point his final marginal indifference curve $N''-I''_x$ would cut the $CC_0$ line.[3] In the absence of an anti-smoke law, and prior to any agreement between $X$ and $Y$, $OQ_0$ is the output of heat, and smoke, produced.

At the welfare level remaining to $Y$ when $Q_0$ units of smoke are produced the maximum he will pay to rid himself of the first unit is given by $C_0R$. If he paid the maximum for each unit of smoke successively withdrawn his welfare would remain unchanged and the marginal indifference curve traced would be that in the Figure shown by $M'-I'_y$.[4] If, however, an anti-smoke law were in effect, his welfare would be higher, and the minimum sum that would induce him to bear with a first unit of smoke would be measured by $CM''$. If he were paid the minimum acceptable to him for all successive units of smoke the sums would trace the marginal indifference curve $M''-I''_y$.

I

We now consider Dolbear's conclusion (1), that the optimal output of smoke production depends on legal responsibility, by reference to this construct. Obviously if an anti-smoke law exists there is initially no smoke, and if there is no such law the initial smoke output is $OQ_0$. If we ignore all costs of decision-taking—which, in practice, might prevent any movement from either of these extremes—and allow negotiation, the optimal output of smoke (and heat) will vary with the law. If in the first place an anti-smoke law prevailed which, however, could be waived in particular instances by voluntary agreement between the affected parties, $Y$ could be exactly compensated by $X$ with a payment of $CM''$ for the first unit of smoke suffered by $Y$, successive units borne by $Y$ being compensated according to the

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[2] The *marginal* indifference curve is the curve of the first derivative of the corresponding indifference curve.

[3] Thus, the marginal indifference curve $N''-I''_x$ is the first derivative of the highest indifference curve reached when $(OQ_0)$ units of heat are bought at price $OC$. Any point along $N''-I''_x$ reveals the maximum payment $X$ is willing to make for the corresponding unit when his welfare remains unchanged at the level associated with the $N''-I''_x$ curve.

[4] This upward-sloping curve has the normal shape, in that paying for a "bad" to be removed is akin to buying a good, and is downward-sloping when moving from *right to left*. On the other hand, the $M''-I''_y$ curve is to be regarded as moving from left to right, in the usual way, since $Y$'s acceptance of successive units of smoke, a "bad," is akin to surrender of successive units of a good for which he requires increasing amounts of compensation.

height of the $M''-I''_y$ curve measured from the $CC_0$ line. The optimal smoke output would be at $Q_1$ at which point some marginal indifference curve for $X$, $I''\,'_x$, $(I'_x<I'\,''_x<I''_x)$ cuts the $I''_y$ curve. For, as a result of $X$'s making compensatory payments to $Y$ that are less than $X$'s initially maximum payments (as indicated by his $I'_x$ curve), $X$'s welfare continues to rise until the optimal output is reached and, along with it, his marginal indifference curve.

If, on the other hand, the law were permissive with respect to smoke, we begin at output $OQ_0$ with $Y$ taking the initiative in offering compensation to $X$ for foregoing heat. If $Y$ paid exact compensation to $X$, payments per unit would follow the difference between $CC_0$ and the $N''-I''_x$ line moving leftward. Since these payments are smaller than the maximum that $Y$ could offer to rid himself of successive units of smoke (while maintaining his welfare at the $OQ_0$ smoke level), $Y$'s welfare increases as compared with his situation when $OQ_0$ units of smoke are produced, and his corresponding marginal indifference curve rises from $I'_y$ to $I''\,'_y$ $(I'_y<I'\,''_y<I''_y)$ at which level it cuts the $N''-I''_x$ curve. The optimal amount of smoke is now at $Q_2$, which amount is necessarily larger than the amount $Q_1$ reached from the anti-smoke law.

The conclusion that—assuming always positive welfare effects—the optimal amount of "social damage" will always be smaller if the law is initially anti-"social damage" (regardless of decision costs) is not altered, indeed it is strengthened, if either side pays more than the required minimum compensation. Beginning from an anti-smoke law, for example, if $X$ paid to $Y$ more than is indicated by $Y$'s $M''-I''_y$ curve, $X$'s resulting $I''\,'_x$ curve would be lower than that indicated in the Figure while the relevant marginal indifference curve for $Y$ would be above $M''-I''_y$. The resulting optimal output would therefore be still less than $Q_1$. Similar reasoning beginning with a permissive smoke law would reveal an optimal output greater than $Q_2$. For "normal," or positive, welfare effects it therefore follows that if more than exact compensation is paid the difference in optimal outputs arising from a difference in the law is greater.

## II

Let us now take the analysis a stage further by considering the opportunities for tax-induced optima. In the absence of an anti-smoke law the welfares of $X$ and $Y$ *before agreement* are those associated with $M'-I'_y$ and $N''-I''_x$. As distinct from the realized output under these conditions, $Q_0$, the optimal smoke output consistent with these particular levels of welfare is that given by $Q_3$ at the intersection of the two curves in question. Regardless of what the government does with the tax proceeds, it is just not possible to reach $Q_3$ by imposing any kind of excise tax on heat alone—unless the excise tax paid by $X$ is exactly offset by a direct subsidy to him—simply because the effect of such a tax is to reduce $X$'s welfare and place him on a marginal indifference curve below that of $N''-I''_x$. However, in qualification of conclusion (2), $Q_3$ could be realized if, instead, the government offered $X$ an excise subsidy for reducing his consumption of heat from $Q_0$ to $Q_3$ by reference to $X$'s $N''-I''_x$ curve while at the same time levying an

excise tax on $Y$ for the removal of successive units of smoke from $Q_0$ to $Q_3$ by reference to $Y$'s $M'-I'_y$ curve.

Similarly, if, instead, an anti-smoke law prevailed in the first instance, the relevant welfares would be those associated with $I'_x$ and $I''_y$ for which levels of welfare the optimal output is $OQ_4$. This optimal output could be realized on removing the smoke prohibition only by imposing an excise tax on $X$ according to his $N'-I'_x$ curve while offering an excise subsidy to $Y$ according to his $M''-I''_y$ curve up to output $Q_4$. In this case also, since the welfare levels of $X$ and $Y$ remain unchanged, the government will be left with some net revenue. In contrast, if instead $X$ and $Y$ negotiated their way to some optimal output (which could not be $Q_4$ or $Q_5$) the government would gain nothing but the welfare levels of one or both parties would be raised.

What is not generally possible, however, is to impose only a *constant* excise tax on heat and reach exactly either $Q_4$ or $Q_3$ (where initial welfare gains or losses are exactly compensated) since such a tax must alter $X$'s initial welfare as indicated either by $I'_x$ or $I''_x$. Even if one is constrained to constant excise taxes, however, this distributional effect need not worry one since the government can always influence the distribution of welfare through transfer payments while promoting optimal outputs by excise taxes.

Conclusion (3) also needs qualifying, if not correcting. If we do decide to introduce an excise tax on each successive unit of heat produced by $X$ then, prior to any heat production, the initial marginal indifference curves are $N'-I'_x$ and $M''-I''_y$, with optimal output $OQ_4$ corresponding to these respective levels of welfare. The excise tax suggested by the diagram is equal to $TS$. But the levying of constant excise tax on heat of exactly $TS$ may not result in an optimal output—assuming the government does not use any of the tax proceeds to compensate $Y$.[5] This is because the constant excise tax, $TS$, being initially below the maxima that $X$ would pay for successive units of heat, raises $X$'s welfare and also, therefore, his marginal indifference curve above $N'-I'_x$. For $Y$, on the other hand, the introduction of successive units of smoke serves only to reduce his marginal indifference curve below $M''-I''_y$. Thus, the tax $TS$ may prove too high or too low to coincide with the intersection of the resultant marginal indifference curves for $X$ and $Y$, and if so it would not be an optimal tax. However, if the tax $TS$ turns out to be above the intersection of the resultant marginal indifference curves it is clearly too high and must be revised downward. Conversely, if it turns out to be below this intersection, it is too low and must be revised upward. Allowing for continuity, there is always some constant excise tax which is consistent with the resulting intersection of the marginal indifference curves for $X$ and $Y$ and, therefore, is consistent with an optimal output.

### III

These results are not surprising. Levels of welfare for $X$ and $Y$ corresponding to an initial nonoptimal output—either to that of a smoke-permitting law or that of an anti-smoke law—cannot be maintained if, in establishing

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[5] If the government exactly compensates $Y$, his original $M''-I''_y$ curve is maintained, the required tax exceeds $TS$, and the optimal output to be reached is still greater than $OQ_4$. If however, the government more than fully compensates $Y$, the required tax is greater still, but the optimal output could be anywhere in the neighbourhood of $OQ_4$.

optimal outputs, excise taxes or subsidies are such as to alter these welfare levels. If it *is* important that such welfare levels be maintained it may be achieved as indicated, either by a system of excise taxes and subsidies that follow the path of each of the relevant marginal indifference curves, or else by constant excise taxes plus lump sum transfers. In the absence of such special measures, however, it must be accepted that government tax intervention, in particular a constant excise tax or subsidy, will have distributive effects on welfare. If an exact optimal output is established—and in principle it may always be established by some constant excise tax—it will not in general be consistent with the initial levels of welfare. However, any desired distribution of welfare can be established in the first instance by lump sum transfers and to any such welfare distribution there corresponds an optimal output, one that could be realized, if necessary, by either of the tax devices indicated above.

And this brings us to the last of Dolbear's conclusions considered here (4), that it is not simple to "regulate externality" with a tax system. This is a practical matter. An exact rate of excise tax, though conceptually determinate for some optimal output, would obviously be difficult to calculate. But such a difficulty is not peculiar to external effects. It is general to the calculation of any excise tax aimed to produce an exact optimal output, an exact amount of tax revenue, or an exact reduction in output. For in all such cases the distribution of welfare is to some extent affected and consequently the relevant marginal indifference curves are shifted. Thus, even if statistical estimates of the demand and supply schedules were perfect, and were deemed to be absolutely reliable over the future, we could not calculate an exact result without having, also, perfectly accurate information about welfare-induced shifts of the marginal indifference curves.

Does this matter? Hardly. Provided the welfare effects involved are small, the deviation from some exactly defined output is likely to be small. In a science of human behavior, where a ten per cent error of prediction over a several-year period is more an occasion for rejoicing than dismay, such difficulties cannot be taken seriously. If by excise taxes and/or subsidies the government can bring the economy as a whole closer to overall optimality—while correcting, if necessary, unwanted distributional effects through direct transfers—it need not feel inhibited by the practically insurmountable difficulties of exact calculations.[6]

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1. F. T. DOLBEAR, JR. "On the Theory of Optimum Externality," *Am. Econ. Rev.*, March 1967, *57*, 90–103.

[6] As an addendum to the above, it may be remarked that the introduction of many buyers of heat and many smoke victims, which requires that individual marginal indifference curves be added, the aggregate marginal indifference curves will, in general, be different for each different initial distribution of welfare. This implication, plus the possibility that some individuals will both buy heat and suffer smoke, poses no special conceptual problems. Optimal positions are multiplied, but, as in the two-person case, they are all exactly determinate. The actual calculation of exact optimal positions, however, will always be impracticable.

## On the Theory of Optimum Externality: Comment

One of the major points in a recent article by F. T. Dolbear, Jr., which appeared in this *Review* [1], was the demonstration that "it is not in general possible to impose a per-unit tax [on someone generating external diseconomies] which will simultaneously compensate (exactly) for damages and achieve a Pareto optimum" [1, p. 102]. If this is so, it obviously has serious consequences for public authorities who desire to eliminate the inefficiencies associated with marginal external diseconomies of various types. This note will show, however, that Dolbear's conclusion is really less general than it appears. There will always be some "per-unit tax" which will exactly compensate for damages and attain a Pareto optimum, if it is possible to attain a Pareto optimum at all.

A brief summarization of Dolbear's reasoning will help to illustrate this point. He considers a two-person model in which one person in producing heat for himself also generates smoke, which adversely affects the other person. He further makes the assumption, which turns out to be critical, that the damaged individual suffers in increasing marginal disutility from smoke (or experiences decreasing marginal utility from fresh air). Presumably, as this individual approaches asphyxiation, each increment of smoke imposes larger and larger amounts of disutility on him, so that he is willing to pay more and more to avoid or remove additional smoke. This implies that the cost, in terms of subjective utility loss, which smoke imposes on the damaged person is not constant for each unit of heat-smoke, but rather increases as more and more units of smoke are consumed.

When this assumption about the shapes of indifference curves is translated into a statement about subjective costs, Dolbear's conclusion does not appear surprising. It is no wonder that a tax imposed at a constant rate per unit of heat-smoke will not exactly compensate an individual who experiences costs which increase per unit of smoke.

What kind of tax would exactly and optimally compensate is also clear from this analysis. It would be a per-unit tax, because its base would be the number of physical units of smoke (or heat), but it would be an *increasing*, rather than a constant per-unit tax. Such a tax would imply an after-tax budget line which is not straight, but rather is concave to the origin. In Dolbear's Figure 4, this line would be tangent to the damaged party's "starting point" indifference curve. This tax would allow the damaged individual to be exactly compensated and at the same time would lead to a Pareto optimum.[1]

This conclusion is not without some practical significance. It suggests, for instance, that in situations in which Dolbear's assumption of increasing marginal disutility of dirty air is appropriate, decision-makers who desire to compensate exactly should consider, not constant per-unit taxes, but ones which increase per unit output of the externality-generating good.[2]

[1] Dolbear's suggestion of a lump-sum *subsidy* plus a per-unit tax on the source of pollution amounts to an increasing per-unit tax when averaged over all units of output. See [1, p. 99].

[2] This analysis assumes, as does Dolbear's, that there is a one-to-one relationship between output of the externality-generating good and that of the externality.

More generally, and perhaps more importantly, it suggests that qualitative characteristics of an optimal tax should be tailored to those of the cost being imposed. It might well be the case that consumers experience *decreasing* marginal disutility from pollution. For instance, once pollution makes a lake unfit for swimming and drinking purposes, additional increments of pollution, which serve only to make it more odiferous, might produce smaller and smaller reduction in consumers' utilities. In such a case, optimality could be achieved by a per-unit tax which *decreased* per unit of output.[3]

Another and probably quite common situation would be one in which consumers experience *constant* costs of pollution. For instance, by the operation of some kind of mechanical device, consumers might well be able to remove pollution at a constant marginal cost of pollution removed.[4] It would then be irrelevant whether they get decreasing marginal utility from clean air or not, so long as the global optimality conditions were not violated (i.e., so long as the total cost of removing the pollutant did not exceed the total benefits from cleaner air to the damaged individuals). In his analysis, Dolbear ignored the possibility, which may be fairly general, that the damaged individual could be returned to his starting-point indifference curve by methods other than compensation for damages suffered. If this possibility is considered, it appears that a constant per-unit tax may exactly and optimally compensate damaged individuals in a great number of cases. A per-unit tax, even a constant one, will lead to a Pareto optimum more often than Dolbear suggests.

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## On the Theory of Optimum Externality: Reply

It was not my intention to suggest that taxes (or subsidies) cannot play a major role in mitigating the effects of externalities. Rather, I wished to indicate, using conventional assumptions of price theory, that some *qualifications* to the usual classroom externality prescription are necessary. Such qualifications notwithstanding, I have considerable sympathy for Pigovian tax-subsidy policies.

Pauly's comment is directed toward my conclusion that "it is not in general possible to impose a per-unit tax which will simultaneously compensate (exactly) for damages and achieve a Pareto optimum." He promises to show the desired result *can* be achieved with a "per-unit tax." However, it turns out

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[3] Alternatively, optimality could be attained by a per-unit tax and a lump-sum tax levied on the source of pollution.

[4] In such a case, knowledge of the costs of reducing damage from pollution may also be much easier to obtain than in the cases Dolbear [1, pp. 99-101] considers.

that he has in mind an "increasing per-unit tax"; the average as well as the total tax depends on quantity consumed.[1] In general of course, the necessary marginal conditions can be satisfied with a constant per-unit tax which equates marginal social and private cost, and the distribution of income can be changed through lump sum transfers. Pauly accomplishes the same end— through variable inframarginal tax rates. His method is similar to variable rates often advanced for optimal pricing of public utilities.

Pauly also shows that increasing, constant, or decreasing per-unit taxes would be appropriate where the marginal disutility of smoke was increasing, constant, or decreasing (respectively). I agree. However, as I pointed out in section V, there are difficulties in applying these tax rules to situations involving many polluters. In these cases, Pauly's suggestions—to move along the damaged party's indifference curve—will not work. To be sure, it will still be possible in theory to achieve a Pareto optimum with exact compensation for damages. But the exact compensation tax rates which should be presented to the individual polluters cannot be simply derived from the curvature of the starting point indifference curve. Damage (and thus exact compensation) depends on aggregate pollution; consequently, information on the preferences of the polluters is required to derive taxes on individuals which will yield appropriate aggregate payments. Moreover, Pauly's increasing per-unit tax will not, in the general case, be sufficient. If individual polluters are spread over the range of output, a constant marginal rate will be necessary (to satisfy the marginal conditions) and lump sum transfers will be required.

Turning to Mishan's comments, I find his restatement of the problem interesting though I must confess I do not find marginal evaluation curves easy to work with. They are particularly troublesome in analyzing income effects, an important ingredient in the problem at hand. This difficulty is (at first blush) avoided where, in internalizing the externality, Mishan holds constant the welfare levels of *both* parties. However, as Mishan realizes, this is an illusion because income is generated for a third party (government) whose preferences are not represented in the model. This of course is what makes it a "partial analysis." Mishan's construct is especially ill suited for handling cases which involve constant per-unit taxes since not only will the income of the government be affected but also the level of welfare of the two parties. Although Mishan does consider this latter effect on optimal output, the analysis is awkward. It is an unfortunate feature of the model that changes in income cannot be treated systematically but require *ad hoc* shifting of curves.

I have several specific comments. First, Mishan's extensions of my results are easily exhibited in my "triangular Edgeworth box." For example, optimum solution $Q_3$, holding welfare levels in the absence of an anti-smoke law constant, can be located in my Figure 3 (p. 95) where the slopes of indifference curves $I_1{}^X$ and $I_1{}^Y$ are equal. The income (bread) which the government receives is represented by the vertical distance between the two curves. A similar correspondence can be found between solution $Q_4$ and curves $I_2{}^X$ and $I_2{}^Y$.

[1] From an informal poll of my colleagues, I feel reinforced that most economists think a per-unit tax involves a *constant* rate per unit. However, as the discussion below will indicate, I feel the problem is more than semantics.

Second, Mishan's use of taxes and subsidies as *incentives* to internalize externality is not clear. In section II, he employs variable taxes or subsidies to transform the opportunity locus of $X$ and $Y$ onto the appropriate marginal evaluation curve. However, this will not, contrary to Mishan's expectation, induce either to select the intersection of the curves over other (equally desirable) points along the appropriate marginal evaluation curve. Since neither is being made better off, neither has an incentive to maximize. The intersection could be induced through lump sum transfers combined with a per-unit tax (or subsidy) on $X$.

Finally, Mishan considers whether it will be simple to regulate externality with a tax system. I agree that it is a practical matter. He suggests the problem is likely to be small because the welfare effects of the internalizing technique will be small. However, in some real world cases that come to mind (e.g., Pauly's example of water pollution), compensation at marginal damage rates leads to considerable deviation from exact compensation.

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# The Economics of Moral Hazard: Comment

· When uncertainty is present in economic activity, insurance is commonly found. Indeed, Kenneth Arrow [1] has identified a kind of market failure with the absence of markets to provide insurance against some uncertain events. Arrow stated that "the welfare case for insurance of all sorts is overwhelming. It follows that the government should undertake insurance where the market, for whatever reason, has failed to emerge" [1, pp. 945, 961]. This paper will show, however, that even if all individuals are risk-averters, insurance against some types of uncertain events may be nonoptimal. Hence, the fact that certain kinds of insurance have failed to emerge in the private market may be no indication of nonoptimality, and compulsory government insurance against some uncertain events may lead to inefficiency. It will also be shown that the problem of "moral hazard" in insurance has, in fact, little to do with morality, but can be analyzed with orthodox economic tools.

The particular type of insurance for which the argument will be presented is that of insurance against medical care expenses, for it was in a discussion of medical expense insurance that Arrow framed the propositions cited above. However, the analysis is applicable as well to other types of insurance, such as automobile collision insurance.

## I. *The Welfare Implications of Insurance*

It is assumed that all individuals are expected utility maximizers and are risk-averters, and that the incidence of illness is a random event. This excludes preventive medicine from consideration, and it also ignores the effect that medical insurance might have on the purchase of preventive care. Bernoulli's theorem, as cited by Arrow [1, pp. 959-61], states that such individ-

uals will prefer insurance with a premium $m$ which indemnifies against all costs of medical care to facing without insurance a probability distribution of such expenditures with mean $m$.

There is a social gain obtained by purchase of this insurance (as long as the insurer suffers no social loss) since pooling of risks reduces the total risk, and therefore the risk per insured, because of the Law of Large Numbers. Of course, the existence of transactions costs means that the policy is not really offered at the actuarially fair premium $m$. However, since the individual preferred actuarially fair insurance to self-insurance, he will prefer some insurance with an actuarially unfair premium to self-insurance, so long as the premium is not too "unfair." His preference in this regard will depend on the intensity of his risk aversion and the strength of the Law of Large Numbers in reducing risk.

As indicated above, Arrow concluded from this analysis that the absence of commercial insurance against some uncertain medical-care expenses provides a case for government intervention to provide such insurance. Dennis Lees and R. D. Rice [6] answered that this insurance was not offered because of selling and transactions costs. Arrow [2] replied, in effect, that such costs were dead-weight losses anyway, and indeed would be eliminated by compulsory social insurance. It seems clear, however, that there is another and better way to explain why some insurances are not offered commercially. It is to show that some, perhaps many, medical care expenses are not "insurable" in the standard sense.

In order for the welfare proposition given above to be valid, the costs of medical care must be random variables. But if such expenses are not completely random, the proposition no longer holds. The quantity of medical care an individual will demand depends on his income and tastes, how ill he is, and the price charged for it. The effect of an insurance which indemnifies against all medical care expenses is to reduce the price charged to the individual at the point of service from the market price to zero. Even if the incidence of illness is a random event, whether the presence of insurance will alter the randomness of medical *expenses* depends on the elasticity of demand for medical care. Only if this demand is perfectly inelastic with respect to price in the range from the market price to zero is an expense "insurable" in the strict sense envisioned by Arrow's welfare proposition.

Suppose, for example, that an individual faces the probability $p_1 = \frac{1}{2}$ that he will not be sick at all during a given time period (event $I_1$) and so will demand no medical care, probability $p_2 = \frac{1}{4}$ that he will contract sickness $I_2$, and probability $p_3 = \frac{1}{4}$ that he will contract "more serious" sickness $I_3$. The position of his demand curve for medical care depends on which illness, if any, he contracts. In Figure 1, it is assumed that his demand curves $D_2$ and $D_3$ are perfectly inelastic, and that his demand curve for the "no illness" case is identical with the $y$-axis. Without insurance, the individual faces the probability $p_1$ that he will incur no medical expenses, the probability $p_2$ that he will need 50 units of medical care (which is assumed to be priced at marginal cost), and the probability $p_3$ that he will need 200 units of medical care at a cost of 200 $MC$. The mean of this probability distribution (or the expected values of the
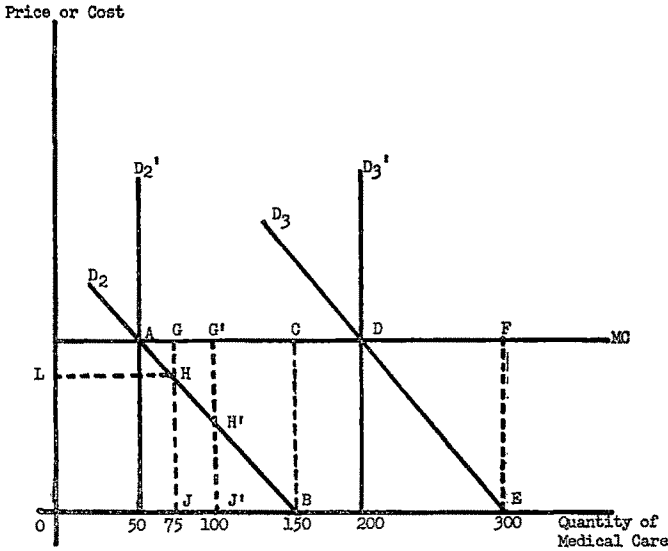
**Figure 1**

individual's medical care expenses) equals ($\frac{1}{2} \times 0 + \frac{1}{4} \times 50 \ MC + \frac{1}{4} \times 200 \ MC$) or 62.5 $MC$. Hence, an actuarially fair insurance which indemnifies the individual against all costs of medical care could be offered at a premium $P$ of 62.5 $MC$. Arrow's welfare proposition indicates that the individual would prefer paying a premium of 62.5 $MC$ to risking the probability distribution with the mean $m = 62.5 \ MC$.

Suppose, however, that the individual's demand curves are not all perfectly inelastic, but are as $D_2'$ and $D_3'$. Then the individual has to choose between facing, without insurance, the probability distribution ($\frac{1}{2} \times 0 + \frac{1}{4} \times 50 \ MC + \frac{1}{4} \times 200 \ MC$) with a mean $m$ of 62.5 $MC$, and paying a premium of $P = (\frac{1}{2} \times 0 + \frac{1}{4} \times 150 \ MC + \frac{1}{4} \times 300 \ MC) = 112.5 \ MC$ in order to obtain insurance. In such a case, he may well prefer the risk to the insurance.

The presence of elasticity in the demand curves implies therefore that the individual will alter his desired expenditures for medical care because of the fact of insurance. The individual who has insurance which covers all costs demands medical care as though it had a *zero* price, but when he purchases insurance, he must take account of the *positive* cost of that care, as "translated" to him through the actuarially necessary premium. Hence, he may well not wish to purchase such insurance at the premium his behavior as a purchaser of insurance and as a demander of medical care under insurance makes necessary.[1]

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[1] This is exactly the same sort of "inconsistency" that Buchanan has noted in connection with the British National Health Service. Individuals demand medical care as though it were free but in voting decisions consider the positive cost of such care. Hence, they vote, through their representatives in the political process, to provide facilities for less medical care than they demand in the market. See [4].

The presence of a "prisoners' dilemma" motivation makes this inconsistency inevitable.[2] Each individual may well recognize that "excess" use of medical care makes the premium he must pay rise. No individual will be motivated to restrain his own use, however, since the incremental benefit to him for excess use is great, while the additional cost of his use is largely spread over other insurance holders, and so he bears only a tiny fraction of the cost of his use. It would be better for all insurance beneficiaries to restrain their use, but such a result is not forthcoming because the strategy of "restrain use" is dominated by that of "use excess care."

If the demand for medical care is of greater than zero elasticity, the existence of this "inconsistency" implies that inefficiency may well be created if individuals are forced, by taxation, to "purchase" insurance which indemnifies against some kinds of medical care expense. For an efficient solution, at least some price-rationing at the point of service may be necessary.

Suppose there are no significant income effects on the individual's demand for medical care resulting from his payment of a lump-sum premium for insurance. In Figure 1, the inefficiency loss due to behavior under insurance, if that insurance were compulsory, would then be roughly measured by triangles *ABC* and *DEF*. These areas represent the excess that individuals do pay over what they would be willing to pay for the quantity of medical care demanded under insurance. Against this loss must be offset the utility gain from having these uncertain expenses insured, but the net change in utility from a compulsory purchase of this "insurance" could well be negative.

Moreover, if individual demands for medical care differ, it is possible that the loss due to "excess" use under insurance may exceed the welfare gain from insurance for one individual but fall short of it for another individual. It follows that it may not be optimal policy to provide compulsory insurance against particular events for all individuals. Some events may be "insurable" for some persons but not for others. It also follows that some events, though uncertain, may not be insurable for anyone. If persons differ (a) in the strength of their risk aversion or (b) in the extent to which insurances of various types alter the quantity of medical care they demand, an optimal state will be one in which various types of policies are purchased by various groups of people. There may be some persons who will purchase no insurance against some uncertain events.

Insurance is more likely to be provided against those events (a) for which the quantity demanded at a zero price does not greatly exceed that demanded at a positive price, (b) for which the extent of randomness is greater, so that risk-spreading reduces the risk significantly, and (c) against which individuals have a greater risk-aversion. There is uncertainty attached to "catastrophic" illness, but it appears that the elasticity of demand for treatment against such illness is not very great (in the sense that there is one and only one appropriate treatment). Furthermore, the "randomness" attached to such illnesses is relatively great, in the sense that they are unpredictable for any individual, and people's aversion to such risk is relatively great. Hence, one would expect to

[2] For a discussion of the prisoners' dilemma problem, see [7].

find, and does find, insurance offered against such events. Similar statement might be made with respect to ordinary hospitalization insurance.

There is also some uncertainty attached to visits to a physician's office, but the extent of randomness and risk-aversion is probably relatively low for most persons. The increase in use in response to a zero price would be relatively great. One would not expect to find, and does not in general find, "insurance" against such events. Similar analysis applies to insurance against the cost of dental care, eyeglasses, or drugs.

## II. *Moral Hazard*

It has been recognized in the insurance literature that medical insurance, by lowering the marginal cost of care to the individual, may increase usage; this characteristic has been termed "moral hazard." Moral hazard is defined as "the intangible loss-producing propensities of the individual assured" [4, p. 463] or as that which "comprehends all of the nonphysical hazards of risk" [5, p. 42]. Insurance writers have tended very strongly to look upon this phenomenon (of demanding more at a zero price than at a positive one) as a moral or ethical problem, using emotive words such as "malingering" and "hypochondria," lumping it together with outright fraud in the collection of benefits, and providing value-tinged definitions as "moral hazard reflects the hazard that arises from the failure of individuals who are or have been affected by insurance to uphold the accepted moral qualities" [5, p. 327], or "moral hazard is every deviation from correct human behavior that may pose a problem for an insurer" [3, p. 22]. It is surprising that very little economic analysis seems to have been applied here.[3]

The above analysis shows, however, that the response of seeking more medical care with insurance than in its absence is a result not of moral perfidy, but of rational economic behavior. Since the cost of the individual's excess usage is spread over all other purchasers of that insurance, the individual is not prompted to restrain his usage of care.

## III. *Deductibles and Coinsurance*

The only type of insurance so far considered has been an insurance which provides full coverage of the cost of medical care. However, various devices are written into insurance, in part to reduce the moral hazard, of which the most important are deductibles and coinsurance.[4] The individual may well

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[3] In his original article, Arrow mentions moral hazard as a "practical limitation" on the use of insurance which does not "alter the case for creation of a much wider class of insurance policies than now exist." [1, p. 961]. However, Arrow appears to consider moral hazard as an imperfection, a defect in physician control, rather than as a simple response to price reduction. He does not consider the direct relationship which exists between the existence of moral hazard and the validity of the welfare proposition. More importantly, in the controversy that followed [2] [6], moral hazard seems to have been completely overlooked as an explanation of why certain types of expenses are not insured commercially.

[4] A deductible is the exclusion of a certain amount of expense from coverage; coinsurance requires the individual to pay some fraction of each dollar of cost.

prefer no insurance to full coverage of all expenses, but may at the same time prefer an insurance with these devices to no insurance.[5]

## A. *Deductibles*

Suppose the insurance contains a deductible. The individual will compare the position he would attain if he covered the deductible and received additional care free with the position he would attain if he paid the market price for all the medical care he consumed but did not cover the deductible. If income effects are absent in Figure 1, the individual will cover a deductible and consume 150 units of medical care when event $I_2$ occurs as long as the "excess" amount he pays as a deductible (e.g., area $AGH$ for a deductible of 75 $MC$) is less than the consumer's surplus he gets from the "free" units of care this coverage allows him to consume (e.g., area $HJB$). If the deductible exceeds 100 $MC$ (at which point area $AG'H'$ equals area $H'J'B$), the individual will not cover the deductible and will purchase 50 units. Hence, the deductible either (a) has no effect on an individual's usage or (b) induces him to consume that amount of care he would have purchased if he had no insurance. If there are income effects on individual demands, because the deductible makes the individual poorer his usage will be restrained somewhat even if he covers the deductible.

## B. *Coinsurance*

Coinsurance is a scheme in which the individual is, in effect, charged a positive price for medical care, but a price less than the market price. The higher the fraction paid by the individual, the more his usage will be curtailed. In Figure 1, if he had to pay $OL$ of each unit's cost, he would reduce his usage if event $I_5$ occurred from 150 units to 75 units. The smaller the price elasticity of demand for medical care, the less will be the effect of coinsurance on usage.

It is possible for the restraining effect of coinsurance to reduce moral hazard enough to make insurance attractive to an individual who would have preferred no insurance to full-coverage insurance. Indeed, there is an optimal extent of coinsurance for each individual. The optimal extent of coinsurance is the coverage of that percentage of the cost of each unit of medical care at which the utility gain to the individual from having an additional small fraction of the cost of each unit of care covered by insurance equals the utility loss to him upon having to pay for the "excess" units of care whose consumption the additional coverage encourages. If the marginal gain from the coverage of additional fractions of cost always exceeds the marginal inefficiency loss, he will purchase full coverage insurance; if the marginal loss exceeds the marginal gain for all extents of coinsurance, the individual will purchase no insurance. If individual demands differ, the optimal extent of coinsurance will differ for different individuals.

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[5] Arrow [1, pp. 969-73] gives some other arguments to explain why the individual will prefer insurance with deductibles or coinsurance to insurance without such devices.

## IV. *Conclusion*

It is possible to conclude that even if all individuals are risk-averters, some uncertain medical care expenses will not and should not be insured in an optimal situation. No single insurance policy is "best" or "most efficient" for a whole population of diverse tastes. Which expenses are insurable is not an objective fact, but depends on the tastes and behavior of the persons involved.

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## The Economics of Moral Hazard: Further Comment

Mr. Pauly's paper [3] has enriched our understanding of the phenomenon of so called "moral hazard" and has convincingly shown that the optimality of complete insurance is no longer valid when the method of insurance influences the demand for the services provided by the insurance policy. This point is worth making strongly. In the theory of optimal allocation of resources under risk bearing it can be shown that competitive insurance markets will yield optimal allocation when the events insured are not controllable by individual behavior. If the amount of insurance payment is in any way dependent on a decision of the insured as well as on a state of nature, then the effect is very much the same as that of any excise tax and optimality will not be achieved either by the competitive system or by an attempt by the government to simulate a perfectly competitive system. For some earlier, less detailed, discussions of this point see [1, pp. 55-56], [2, pp. 961-62].

In this note, I would like to stress a point which Mr. Pauly overlooks in his exclusive emphasis on market incentives. Mr. Pauly has a very interesting sentence: "The above analysis shows, however, that the response of seeking more medical care with insurance than in its absence is a result not of moral per-

fidy, but of rational economic behavior." We may agree certainly that the seeking of more medical care with insurance is a rational action on the part of the individuals if no further constraints are imposed. It does not follow that no constraints ought to be imposed or indeed that in certain contexts individuals should not impose constraints on themselves. Mr. Pauly's wording suggests that "rational economic behavior" and "moral perfidy" are mutually exclusive categories. No doubt Judas Iscariot turned a tidy profit from one of his transactions, but the usual judgment of his behavior is not necessarily wrong.

The underlying point is that, if individuals are free to spend as they will with the assurance that the insurance company will pay, the resulting resource allocation will certainly not be socially optimal. This makes perfectly reasonable the idea that an insurance company can improve the allocation of resources to all concerned by a policy which rations the amount of medical services it will support under the insurance policy. This rationing may in fact occur in several different ways: (1) there might be a detailed examination by the insurance company of individual cost items allowing those that are regarded "normal" and disallowing others, where normality means roughly what would have been bought in the absence of insurance; (2) they may rely on the professional ethics of physicians not to prescribe frivolously expensive cost of treatment, at least where the gain is primarily in comfort and luxury rather than in health improvement proper; (3) they may even, and this is not as absurd as Mr. Pauly seems to think, rely on the willingness of the individual to behave in accordance with some commonly accepted norms.

The last point is perhaps not so important in the specific medical context, but the author had clearly broader implications in mind and so do I. Because of the moral hazard, complete reliance on economic incentives does not lead to an optimal allocation of resources in general. In most societies alternative relationships are built up which to some extent serve to permit cooperation and risk sharing. The principal-agent relation is very pervasive in all economies and especially in modern ones; by definition the agent has been selected for his specialized knowledge and therefore the principal can never hope completely to check the agent's performance. You cannot therefore easily take out insurance against the failure of the agent to perform well. One of the characterestics of a successful economic system is that the relations of trust and confidence between principal and agent are sufficiently strong so that the agent will not cheat even though it may be "rational economic behavior" to do so. The lack of such confidence has certainly been adduced by many writers as one cause of economic backwardness.

The lesson of Mr. Pauly's paper is that the price system is intrinsically limited in scope by our inability to make factual distinctions needed for optimal pricing under uncertainty. Nonmarket controls, whether internalized as moral principles or externally imposed, are to some extent essential for efficiency.

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## The International Flow of Human Capital: Comment

In a paper published in the *American Economic Review* of May, 1966 [2], Herbert Grubel and Anthony Scott argue that the emigration of highly skilled individuals should be evaluated in terms of its effect on the income of the individuals remaining in the country. Using this criterion the authors reason that ". . . emigration should be welcome . . ." whenever the following two conditions are met: ". . . first that the emigrant improves his own income and, second, that the migrant's departure does not reduce the income of those remaining behind" [2, p. 270]. The first condition is assumed to be met when the individual emigrates of his own free will. The second condition is deemed to be met in the case of a ". . . market economy where persons are paid their marginal product . . ." and hence where ". . . the emigrant removes both his contribution to national output and the income that gives him a claim to this share so that other incomes remain unchanged" [2, p. 270]. The authors acknowledge that emigration may cause a redistribution of income by changing the marginal products of the remaining people, but they argue that ". . . since the brain drain involves rather small numbers of people, these effects are likely to be small enough to be safely considered negligible" [2, p. 270]. Grubel and Scott then conclude that a reduction in the welfare of the remaining population could only arise out of short-run adjustment costs or failures of the free market to allocate resources efficiently (i.e., the case of external economies or the case of market failure remedied through activities of the government). In the case of externalities, Grubel and Scott distinguish between external economies which are associated with the personal characteristics of the emigrant and external economies which are associated with his profession. In regard to external economies associated with the emigrant's profession, the authors state that:

> . . . if a typical doctor's work contains a large measure of social benefits for which he does not get compensated, these benefits are lost to society only for the length of time required to train another person to take his place as a doctor. It therefore follows that in many of the well-known instances of genuine external effects in consumption or production, emigration imposes only short-run frictional costs to society which disappear in the long run. [2, p. 271]

Finally, having found that only minor or temporary losses in income could result from emigration of the highly skilled, Grubel and Scott conclude by

stating: "A good case can therefore be made for a continuation of present policies and the free movement of human capital throughout the world" [2, p. 274].

I

The results of the Grubel and Scott analysis if applied to an underdeveloped country, for example, tell us that the remaining population of the underdeveloped nation is not adversely affected if highly skilled individuals leave. This seems to be a rather amazing conclusion in view of the fact that the shortage of skilled personnel is generally considered to be a major factor in preventing the economic development of such nations. The fact is, however, that the conclusion of Grubel and Scott is arrived at only because of an error in their analysis. The error is found in the statement "in a market economy where persons are paid their marginal product" which, literally interpreted, implies that all employed persons are paid their marginal product. This is not true, of course, because it is only the marginal worker who receives the full value of his marginal product with all workers being paid only what the marginal worker is worth. Hence if we look at a market economy at two points in time, first with $n$ skilled workers and a given quantity of other factors of production (including unskilled workers), and second with $n - 1$ skilled workers and the same quantity of the other factors, it is true that there will be no reduction in the income available for the remaining factors of production (i.e., income available to the remaining skilled workers and the constant quantity of other factors). On the other hand, if we start at the same initial equilibrium position and then compare it to a new equilibrium position with the economy now having $n - 2$ or fewer skilled workers, we will find that the income available for the remaining population has been reduced, since while the first skilled emigrant will reduce national product by an amount equal to his income, the second and each succeeding emigrant will reduce national product by an amount which is greater than the income which they had been receiving in the initial situation. Consequently, the Grubel-Scott analysis holds only for the marginal-skilled worker and emigration of significant numbers of highly skilled individuals does tend to reduce the income of the remaining population.

The crux of the matter can be illustrated by using Figure 1, in which is plotted the marginal product for highly skilled workers (plotted as rectangles as opposed to a smooth curve in order to see more clearly the effect of the withdrawal of individual workers) in a perfectly competitive economy. It is assumed that initially there are five skilled workers in the economy but that, in the absence of emigration restrictions, three of the five skilled workers will leave the country. The initial total product of the economy is the sum of the areas under rectangles $A$ through $E$, and $W_1$ is the initial wage paid to skilled workers. The question then is what effect does the emigration of the three skilled workers have on the income of the remaining population?

According to their argument Grubel and Scott would apparently analyze this situation as follows: Emigration of the fifth skilled worker reduces national product by rectangle $E$ which is the income of the skilled worker, and

hence there is no reduction in the income available for the remaining popula-
tion (i.e., the remaining four skilled workers plus the rest of the country's
population). Once the fifth skilled worker has left, the wage paid to skilled
workers will increase to $W_2$ and emigration of the fourth skilled worker then
reduces national product by rectangle $D$, which is now the income of the
fourth skilled worker and hence there is no reduction in the income available



NUMBER OF SKILLED WORKERS
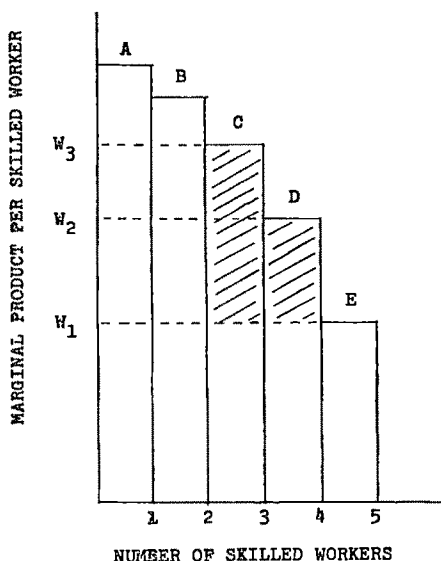
FIGURE 1

for the remaining population (which is now the remaining three skilled work-
ers plus the rest of the country's population). Once the fourth skilled worker
has departed, the wage paid to skilled workers will increase to $W_3$ and thus
emigration of the third skilled worker reduces national product by rectangle
$C$, which is now the income of the third skilled worker and hence there is no
reduction of the income available for the remaining population (which turns
out to be finally the remaining two skilled workers plus the rest of the coun-
try's population).

Actually, the Grubel-Scott argument is nothing more than a series of sep-
arate static comparisons of an economy with and without the skilled worker at
the margin. In terms of the above example, the Grubel-Scott approach, as im-
plied in their article, is not to compare an economy with five skilled workers
to an economy with two skilled workers but rather to compare an economy
with five skilled workers to an economy with four skilled workers and then to
compare an economy with four skilled workers to an economy with three
skilled workers, and so on.

This approach is erroneous because in attempting to deal with the emigra-
tion of two or more skilled workers the argument classifies some skilled work-

ers as both emigrants and part of the remaining population. More precisely, in terms of the above example, the Grubel-Scott approach would classify the fourth skilled worker as "remaining behind" until emigration of the fifth skilled worker has increased the income of the fourth worker at the expense of the other factors of production. Since the other factors of production are owned by individuals who are a part of what will actually be the remaining population while the fourth skilled worker is not, it is at this stage that the income of the remaining population is reduced. Of course, keeping the fourth skilled worker in the "remaining population" category until after this redistribution of income and only then reclassifying him as an emigrant gives Grubel and Scott their conclusion that emigration of the fifth and fourth skilled workers does not reduce the income available to the remaining population. The Grubel-Scott analysis in turn would keep the third skilled worker in the remaining population category until after emigration of the fifth and fourth workers has increased the income of the third, again at the expense of the remaining population. Only then is the third skilled worker reclassified as an emigrant.

Clearly, if one is to analyze the effect of the emigration of highly skilled workers on the income available to the remaining population one must specify at the outset which skilled workers, in the absence of emigration restrictions, will emigrate (and hence cannot be considered part of the remaining population) and which skilled workers will remain in the country.

One must then compare the income of the population remaining after all skilled emigrants have departed to the income the same population had been receiving prior to the departure of the skilled workers. In terms of our example, one should compare the income of the population which will be left if the three skilled workers are allowed to emigrate to the income available to the same people if the three skilled workers had been forced to remain. This is certainly the appropriate comparison since if the country allows free emigration it will end up with only two skilled workers whereas if it prevents emigration of the highly skilled it will be able to retain its original supply of five skilled workers. In our example, the remaining population (or what will be the remaining population if free emigration is allowed) consists of the given non-highly-skilled population plus the two skilled workers who will not emigrate. The income available to the remaining population then consists of the wages paid to the first and second skilled workers plus the income of the other factors of production. As can be seen from Figure 1, prior to emigration of the three highly skilled workers the income of what will be the remaining population consists of rectangles $A$ and $B$ plus the area above $W_1$ in rectangles $C$ and $D$. After emigration of the three skilled workers, the income available to the remaining population consists only of the area in rectangles $A$ and $B$. The income of the remaining population has thus been reduced by the shaded areas in rectangles $C$ and $D$. Clearly the income of the remaining population always tends to be reduced when a free market economy loses two or more highly skilled workers. Consequently, on the basis of the authors' second criterion (i.e., that there be no reduction in the income of the remaining population)

their recommendation "for a continuation of present policies and the free movement of human capital throughout the world" is unjustifiable.

It should be noted that the above argument is a general one, applicable to unskilled as well as skilled labor. While the emigration of either skilled or unskilled workers will tend to reduce the income of the remaining population, there is an important difference between the two classes of labor in terms of the distributional effects of emigration. Emigration of unskilled labor, while it will reduce the income of the remaining population, will also have the favorable effect of bringing about a more equal distribution of income by raising the wages of the remaining unskilled workers at the expense of other factors of production, including skilled workers. Emigration of skilled workers, on the other hand, will not only reduce the income available to the remaining population, but it will also tend to redistribute income from unskilled labor to the remaining skilled workers. Hence emigration of the highly skilled reduces the income of the "poor" and increases inequality of income. Because of this adverse effect on income distribution and because Grubel and Scott's own findings show that some countries are losing a significant number of highly skilled workers,[1] one must have serious reservations about the authors' conclusion that the redistribution effects can be ignored.[2]

## II

Another weakness in the Grubel and Scott argument is their use of absolute reductions in present income as the criterion for determining whether or not emigration has an adverse effect on the remaining population. The selection of this criterion forces one into a comparative static analysis of emigration and prevents one from analyzing dynamic effects. In considering two alternative policies (i.e., allowing the emigration of highly skilled workers and preventing such emigration) one must ask what is the opportunity cost of choosing a given policy? In the case of emigration of highly skilled workers the opportunity cost of allowing emigration is the income which would have become available to the remaining population if the highly skilled workers had not left the country. The use of opportunity cost leads to the conclusion that there can be no objection to emigration whenever the following two conditions are met: (1) the emigrant improves his own income and (2) the migrant's departure does not force the remaining population to relinquish either part of their present income or future increases in income. Even though we have already shown that present income of the remaining population will be reduced through emigration of the highly skilled, the adoption of this second condition leads to different conclusions than those reached by Grubel and Scott in other parts of their analysis.

First, it should be noted that a reduction in present income will tend to

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[1] For example, the authors have found that Greece and Ireland exhibit ". . . what must be considered a substantial annual outflow of scientists and engineers to the United States, given the size of the educational efforts of these countries." [1, p. 373]

[2] Burton Weisbrod [5, p. 278] and Brinley Thomas [4, p. 493] have also questioned minimizing the distributional effects.

reduce future income by a larger amount than the absolute reduction in present income, since a reduction in present income also reduces saving and hence investment, which in turn reduces the ability of the economy to generate increases in income. Second, since the highly skilled individual who emigrates will have had a higher-than-average income, he will in all probability have had a higher-than-average amount of saving. His loss will then tend to reduce the per capita saving of the country and hence per capita investment. This in turn means that future per capita income of the remaining population will be less than it would have been if the highly skilled emigrant had not left.

Next, in regard to external economies which might be associated with the profession of the emigrant, it is true that the country of emigration can restore income reductions which result from the loss of external economies previously provided by, say, a doctor who has emigrated, by training another doctor to take his place. This point is, however, that *ceteris paribus* (including the educational expenditure to train an additional doctor), the remaining population would have been better off if the emigrant doctor had not left. If the doctor had remained, the given educational expenditure would have eventually increased the number of doctors and hence increased the amount of external economies provided by doctors. Consequently, there is an opportunity cost for the remaining population in the form of relinquished future income in allowing the emigration of individuals who provide external economies as a part of their work.[8]

Finally, it is true, as the Grubel-Scott analysis implies, that the emigration of college students (or the failure of students studying abroad to return) does not reduce the income of the remaining population, since the students have never been employed and hence have never contributed to national product. Nevertheless, while the remaining population does not experience a reduction in present income through student emigration, it is forced to forgo additional income since if the students had remained or returned and had become employed (it is assumed that we are dealing with more than one student) they would have increased national product by an amount in excess of the income they would have received. (If $n$ college graduates who have equal ability enter the labor force, the $n$th graduate hired will have a marginal product equal to his wage while the other graduates will receive the same wage but will have marginal products higher than the wage received.) The excess addition to national product will accrue to other factors.

The above arguments have established that there is a significant opportunity cost in terms of both present and future income forgone for the remaining population of a country in allowing highly skilled individuals to emigrate. The actual decision as to whether or not a given country should restrict the emigration of all or a segment of its highly skilled population is basically a value judgment, however, since the decision involves improving the welfare of the general population at the expense of interference with the freedom of the indi-

[8] Thomas argues that since there are likely to be large discrepancies between marginal net social product and income in underdeveloped countries, these countries stand to gain (lose) large marginal external economies if their supply of skilled workers is increased (decreased) [4, pp. 493-94].

vidual to better himself by moving to another country in order to obtain a higher income.

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## The International Flow of Human Capital: Reply

If a person is paid his true marginal social product, his emigration leaves unchanged the incomes of those remaining in the country from which he leaves, except for the redistributive effects of government taxation and spending. Mr. Aitken's comment has failed to prove that this proposition is invalid. All Aitken has shown is that a large number of marginal changes over a relevant time period is equivalent to a nonmarginal change. This a rather well known proposition whose introduction does not show our analysis to be "in error," but extends it. Whether such an extension is a useful exercise and whether it is sufficient to establish that "there is significant opportunity cost in terms of both present and future income for the remaining population of a country in allowing highly skilled individuals to emigrate" as Aitken claims, depends on four factors.

First, can the skilled-person migrations of recent years be described as marginal? Since our and Aitken's analyses are comparative statics, it is necessary to consider periodic flow data, such as annual statistics, and not the cumulated amount of former migration. The basic data on which such judgments must be based have been made available by the U.S. Immigration and Naturalization Service [7]. Even if one takes these data as valid, there remain the difficulties of estimating the stock or current output of highly skilled people in individual countries, for which very few meaningful data are available, and then deciding at what magnitude of emigration a marginal change becomes nonmarginal, that is at .1, 1.0, 10.0, or 25.0 per cent of current output. Aitken has made no contribution to the solution of these difficulties. In our judgment emigration of highly skilled persons in recent years for most countries has been marginal.
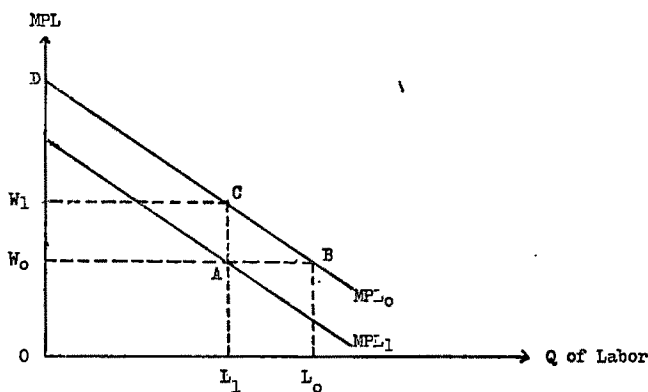
FIGURE 1

We arrive at this judgment in part because we have found the official U.S. immigration statistics to be highly misleading.[1] Immigration authorities are unable to ascertain the true level of schooling of persons who upon entering as immigrants indicate their professions as "engineers," "biologists," "economists," etc. Furthermore, the data fail to indicate where the schooling was obtained and how many of the immigrants return later. In a recent study these biases of the official statistics were shown to be substantial. Whereas the U.S. gain from Sweden over a given period was alleged to be 106, after proper adjustment for true schooling levels and return migration, Sweden's loss came to only 26 [2].

Second, the correct analysis of the effects of the nonmarginal emigration of highly skilled persons is more complicated than Aitken realizes. Consider the normal schedule of the marginal productivity of labor in Figure 1. The emigration of $L_1 L_0$ unskilled workers in the long run leads to a rise in wages from $OW_0$ to $OW_1$, but the total income gained by the remaining labor, $W_0 ACW_1$, is smaller than that lost by the owners of capital, $W_0 BCW_1$. The deadweight loss $ABC$ is, of course, the effect "discovered" by Aitken.

However, let us now consider what happens if $L_1 L_0$ skilled workers leave. From the economist's point of view the essential difference between skilled and unskilled workers is that the former have accumulated a certain amount of human capital. Recent analyses of the concept of human capital [1] [6] have stressed the long-run substitutability of human and physical capital in production functions and in the formation of capital. Therefore, the emigration of highly skilled persons reduces a country's total stock of social capital just as does the export or destruction of physical equipment. If the validity of this basic proposition is granted, it follows that the emigration of $L_0 L_1$ skilled workers shifts down the $MPL$ schedule of unskilled labor because of the reduction in the stock of social capital. Any shift downward reduces the size of the deadweight loss. We have shown elsewhere [4] that the loss is completely eliminated if the value of the emigrants' human capital is equal to the country's per

[1] A detailed analysis of their shortcomings has been presented in [3].

capita endowment of human and physical capital, making the normal assumptions about constant returns to scale and absence of external effects.[2] On the other hand, the welfare loss can be greater than the one associated with the emigration of unskilled workers if the value of the human capital taken along substantially exceeds the per capita endowment, so that the shifted $MPL$ curve intersects the line $L_1C$ far below point $A$ so as to produce a dead-weight loss triangle larger than $ABC$ appearing in the marginal productivity of capital schedule.[3] It should also be noted that the proper incorporation of human capital into the analysis affects the conclusions about income distribution reached by Aitken in rather obvious ways. Furthermore, we wish to point to the fact that the analysis abstracts from short-run losses incurred while human and physical capital are reallocated. We have analyzed these in [4].

Third, we consider the logical validity of Aitken's argument that future income of the remaining population is reduced because the highly skilled emigrant would have had above average savings and raised society's per capita endowment with capital, labor productivity, and total income. This argument neglects entirely the fact that the owner of capital retains claim to its marginal productivity. In the absence of externalities and in equilibrium the marginal utility of borrowed savings is just equal to the last dollar spent on interest, which in turn is just equal to the marginal utility the borrower could have obtained by spending that dollar on other goods and services. Thus, according to economic theory the public remaining behind should be indifferent as to whether the emigrant accumulated his savings in one country or the other. Naturally, for nonmarginal changes this marginal analysis has to be modified in ways rather obvious from the preceding discussion.

Fourth, we turn to the validity of the estimate of the value of externalities associated with the profession of an emigrant. Our point has been in the past [5] that society loses the positive externalities of a medical doctor's work only for as long as it takes to train a replacement. This argument assumes the existence of a market mechanism, supplemented by rational government action to adjust for the externalities through the provision of subsidies in the training of doctors, which causes society to have a determinate stock of physicians that tends to optimal, given society's alternative uses of resources and tastes. For this reason, the loss of one doctor creates incentives to replace him and return to the optimum stock. Aitken's argument implies that the loss of one doctor reduces society's stock for all future times and therefore leads to a loss of the externalities he would have provided for an infinite period in the future. Such a model may describe conditions of the medical profession in the United States at present but we are dubious about its general validity. When govern-

[2] Given a linear homogeneous production function, equi-proportionate reductions in the factors of production leave relative prices of these factors unchanged. Therefore, the new marginal productivity of labor schedule must go through point $A$ if labor and social capital are reduced in equal proportions.

[3] In [4] we have shown that in 1957 the value of total human plus physical capital per person in the United States was approximately $14,400. The human capital value of a person with two years of college education that same year was $14,300. Further research is required to obtain similar estimates for other industrial and the less developed countries, where capital endowment per person is lower but where the cost of instruction and earnings-foregone components of human capital formation are lower also than in the United States.

ments decide to build medical schools they are subjected to pressures from engineers, natural scientists, and others to provide something that from society's point of view resembles an optimum mix and level of practitioners in the various professions.

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## Returns to Scale and the Spacing of Isoquants: Comment

Levenson and Solon [2, pp. 501–5] show that as input quantities are increased isoquants become closer together, are evenly spaced, or become farther apart, as *marginal* returns to scale are increasing, constant, or decreasing. Spacing and marginal returns are examined along a vector with the two inputs varied by equal percentages, and the production function is assumed to display first increasing, then constant, and finally decreasing, marginal returns to scale.

As early as 1911 Edgeworth [1, p. 363] perceived that marginal returns to scale should logically be measured along the expansion path the firm actually utilizes (isocline), and not along a vector. It is the purpose of this comment to examine spacing and marginal returns along both vector and isocline expansion paths. It is shown that increasing marginal returns continue on an isocline after the point of constant marginal returns has been reached along a vector.

Let $Q$, $X$, and $Y$, be quantities of output and two inputs, $k$ be the scale

coefficient, and $a$ and $b$ be arbitrary positive constants. Then:

(1) $$Q = f(X, Y)$$

(2) $$k = aX + bY$$

Isoquants become closer, are evenly spaced, or become farther apart, and marginal returns to scale are increasing, constant, or decreasing, as:

$$\frac{d^2k}{dQ^2} \lessgtr 0$$

From (1) and (2):

(3) $$\frac{dk}{dQ} = \frac{a(dX/dY) + b}{f_X(dX/dY) + f_Y}$$

and:

$$\frac{d^2k}{dQ^2} = \frac{[f_X(dX/dY) + f_Y]ad/dQ(dX/dY)}{[f_X(dX/dY) + f_Y]^2} -$$

$$\frac{[a(dX/dY) + b][(dX/dY)f_{XX}(dX/dQ)}{[f_X(dX/dY) + f_Y]^2}$$

$$\frac{+ (dX/dY)f_{XY}(dY/dQ) + f_X d/dQ(dX/dY)]}{[f_X(dX/dY) + f_Y]^2}$$

$$- \frac{[a(dX/dY) + b][f_{XY}(dX/dQ) + f_{YY}(dY/dQ)]}{[f_X(dX/dY) + f_Y]^2}$$

Since $d/dQ(dX/dY) = (d^2X/dY^2)(dY/dQ)$, $(dX/dQ) = (dX/dY)(dY/dQ)$, and $(dQ/dY) = f_X(dX/dY) + f_Y$, then:

(4) $$\frac{d^2k}{dQ^2} = \frac{[af_Y + bf_X](d^2X/dY^2) - [a(dX/dY) + b]}{[f_X(dX/dY) + f_Y]^3}$$

along either vector or isocline expansion path. In the vector case:

(5) $$\frac{dX}{dY} = X/Y, \qquad \frac{d^2X}{dY^2} = 0$$

and hence:

(6) $$\frac{d^2k}{dQ^2} = \frac{-[a(X/Y) + b][f_{XX}(X/Y)^2 + 2f_{XY}(X/Y) + f_{YY}]}{[f_X(X/Y) + f_Y]^3}$$

along a vector expansion path.

To determine the shape of an isocline, the function:

(7) $$G = Q + \lambda[\bar{k} - aX - bY]$$

is partially differentiated with respect to $X$ and $Y$ to yield:

$$(8) \qquad \frac{\partial G}{\partial X} = f_X - \lambda a = 0$$

$$(9) \qquad \frac{\partial G}{\partial Y} = f_Y - \lambda b = 0$$

for maximum $Q$ for each $k$. Total differentiation of (8) and (9) yields:

$$(10) \qquad \frac{dX}{dY} = \frac{f_Y f_{XY} - f_X f_{YY}}{f_X f_{XY} - f_Y f_{XX}}$$

which is the slope of an isocline. Substitution of (8), (9), and (10), into (4) gives:

$$(11) \qquad \frac{d^2 k}{dQ^2} = \frac{f_{XX} f_{YY} - f_{XY}^2}{\lambda[-f_X^2 f_{YY} + 2 f_X f_Y f_{XY} - f_Y^2 f_{XX}]}$$

along an isocline expansion path.

At the point of maximum marginal returns to scale (equally spaced isoquants) *along a vector*, (6) indicates:

$$f_{XX}(X/Y)^2 + 2 f_{XY}(X/Y) + f_{YY} = 0$$

or:

$$(12) \qquad f_{XY} = - \frac{[f_{XX}(X/Y)^2 + f_{YY}]}{2(X/Y)}$$

Substituting (12) into (11) shows that along the isocline passing through the same point:

$$(13) \qquad \frac{d^2 k}{dQ^2} = \frac{-[f_{XX}(X/Y)^2 - f_{YY}]^2}{-4\lambda(X/Y)[f_X f_{YY} + f_Y f_{XX}(X/Y)][f_X(X/Y) + f_Y]}$$

Within the region of diminishing marginal productivity for both inputs and except for the case of the squared term equal to zero, isoquants are still becoming closer together at this point on the isocline and the point of maximum marginal returns has not yet been reached.

JOHN W. ROWE, JR.*

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# BOOK REVIEWS

## General Economics; Methodology

*Essays in Economics: Theories and Theorizing.* By WASSILY LEONTIEF. New
York and London: Oxford University Press, 1966. Pp. xii, 252. $6.00;
paper, $2.50.

This collection spans 30 years of writing. Most of the articles are theoretical,
but many concern practical problems which were topical at the time. They
cover a wide range of subjects and in the main are readable and enlightening,
with little mathematics and with an occasional dash of polemics. All that can
be done in this review is to discuss some of the more important essays, num-
bered here as in the book.

II, in a dynamically unstable system the variables grow in absolute value
and so do any errors. Leontief suggests that it might be better to test such
systems by examining the movements backwards through time rather than for-
wards. This interesting view, however, ignores two points. Firstly, long-past
data are hard to come by. Secondly, the errors only tend to grow at the same
rate as the true values so that they do not really become more serious.

III, Samuelson's Correspondence Principle advocates we ignore unstable
systems. Then Leontief asks (p. 36) ". . . how would we go about explaining
the rapid and apparently limitless growth of the modern Western economies?"
There is a confusion of the concepts of growth and instability here. The equi-
librium may be growing over time and yet be stable in the proper sense that
the disequilibrium (absolute or perhaps only relative) tends to zero. Economic
growth is quite common; increasingly dominant disequilibrium is not.

After a carping attack in Chapter V on what he calls implicit theorizing,
mainly by the Cambridge economists of the 1930s, the author pays his re-
spects to Marx in his essay VI. He believes that Marx's accusation of "fetish-
ism" in the Classics' value theory is largely wrong, but that he had valuable if
not comprehensive things to say about economic crises. Without accepting his
theoretical analysis of long-run tendencies, Leontief praises Marx for his em-
phasis on real institutions and empirical data and for his breadth of vision.

Part Two (VII) opens with the well-known short 1936 article in which
Leontief maintains that the essential difference between Keynes and the Clas-
sics is the former's denial of the "homogeneity postulate" in the labor market.
In a 1948 essay (VIII), however, he also stresses the importance of the li-
quidity trap.

IX, Leontief bases his criticism on Patinkin's theory on the contentions
that ". . . using paper money as a medium of exchange" and "Since money
does not enter in his utility . . . ," the excess-demand functions for real com-
modities are homogeneous of degree zero in prices and are not independent.
To get these results, however, it is necessary to keep money out of the budget
equation, and it is not easy to see how this can be done if it is financing trans-

actions. Whether money enters the utility function or not is largely irrelevant to the issue.

X is a 1946 article that shows that astute "take it or leave it" bargaining by one party in a conflict situation leads to an efficient distribution of commodities. Since the other side is not allowed any bargaining power, however, the analysis is not so directly applicable to guaranteed annual wage agreements and bilateral international trade agreements as the author thinks.

XI, the famous 1933 article on "The Use of Indifference Curves in the Analysis of Foreign Trade" shows Leontief at his analytic best. The techniques he helped make standard ". . . may partly explain the highly developed interchange of commodities between countries with similar industrial structure" and also show how an offer curve is distorted by an import duty.

XII, Leontief's long 1936 article on index numbers was written independently of Staehle's 1935 classic. He demonstrates an ambiguity in the "ideal price index" even when calculated from the point of view of a given utility level. Granted, but this inconsistency can be avoided by first defining the "ideal quantity index" at given prices and then deriving the corresponding price index to satisfy the total expenditure criterion. Even this measure is not perfect, however. For example, consider situations 1, 2 and 3, with prices the same, and income twice as high, in 1 as in 3. With prices in 2 as base, the index of quantity in 1 is higher than in 3 but not necessarily twice as high, and the corresponding price index may show a difference between 3 and 1.

Leontief tries to solve the index number problem by defining the quantity index in terms of fixed proportions among quantities, but this trick has little appeal. This index is imperfect in the same sort of way as the one discussed above. Notice that the proportions are selected arbitrarily. What makes Hicks' analogous theorem on composite goods work is that he assumes that the proportions (between prices) are fixed by the market. Similarly, rigid complementarity among commodities would suffice. Incidentally, if Leontief's general ideas were acceptable, why consider only fixed proportions? The composite basket could be defined by any curve in the relevant space provided it cut continuously higher indifference curves.

XV, in this 1958 article, Leontief attempts to reduce the complicated business of economic growth to a very simple form, but this leads to several unsatisfactory features. In each period, a decision is made to consume so much and to invest so as to achieve some constant stream of future consumption. When the next period arrives, however, consumption is changed, and the decision-makers never learn from their mistakes. Planning for a nonconstant stream of future consumption is not allowed, despite the growth environment. Finally, tastes are assumed never to change. In his reply to a comment by Fred M. T. Westfield, Leontief fails to realize that the indefinite future *does* enter his present utility function, and consequently misses the real difference between his and Frank Ramsey's model, which is that Ramsey allows a free choice of the planned pattern of future consumption to be made in the present decision period.

In XVII, a simple model of growth is used to examine empirically how much aid rich countries need to give to underdeveloped ones to bring the lat-

ter's growth rates up to the former's. Apart from the obvious dangers of over-simplification, the model contains a serious flaw. The growth rate of a recipient country is raised by the transfer of capital, but the donor's income is still allowed to grow as if the transferred resources were invested domestically. Since in fact the aid must slow down the donor's growth, the problem of the gap, as such, is reduced.

This review has concentrated on various criticisms of the more interesting essays. But these are mere minor blemishes when compared with the wealth of insight, technique, and the expositional skill which dominate the whole collection. There must be few economists indeed who could not profit from a selected reading (or rereading) from it.

M. McMANUS

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## Price and Allocation Theory; Related Empirical Studies

*The Theory and Empirical Analysis of Production.* Edited by MURRAY BROWN. New York: National Bureau of Economic Research, 1967. Pp. x, 515. $12.50.

In the 1950s Professors Solow, Abramovitz, Kendrick and others presented us with evidence that our knowledge of the factors that have contributed to economic growth is very limited. Their evidence suggested that increases in labor inputs and in the stocks of physical assets have accounted for only a small part of the growth in various measures of aggregate output. Apparently other factors were much more important; unfortunately our knowledge of these other factors and how they influenced production was quite limited. Appropriately these early studies gave rise to an enormous number of studies whose object it was to close this ignorance gap. The object of many studies was to introduce new variables into the production function analysis or to improve the measures of the old labor and capital variables. As a logical complement to these studies other work was designed to develop more general functional forms for use in empirical production function analysis. The now well-known CES function resulted from such work. The early studies made use of existing data, but as work progressed the need to develop new and more appropriate data for closing the ignorance gap became apparent. After roughly ten years of work it is time that we assess the progress that we have made, and to chart a provisional course for the next few years. This book serves this function well, and economists, expecially those working in applied econometrics and in economic growth, will find it a useful addition to their library. That some disappointment was expressed in the book concerning the progress to date seems unimportant, for the subject itself (production and economic growth) remains important and an accurate assessment valuable.

After an introduction by the editor, the book opens with a very readable (and enjoyable) chapter by Professor Paul Douglas on the development of the Cobb-Douglas production function. Since Douglas' early work provided a basis for much of the work in the last decade, its inclusion in this volume is useful.

Following these chapters, the book is divided into three parts. Part one contains chapters by Professors R. M. Solow and Marc Nerlove. In his chapter Solow points to a number of developments that may be useful in further empirical production function analysis and points to a number of defects in past studies. The Nerlove chapter represents a comprehensive review and evaluation of the work with CES and related functions; the chapter contains a detailed discussion of the sources of bias in various estimates of the elasticity of substitution. Unfortunately the biases are many and offsetting, and consequently it becomes impossible to identify one set of estimates as being clearly superior to the others, as far as bias is concerned. Though it has been two or more years since this chapter was written, the state of the art as far as CES estimation is concerned remains much the same. Graduate students should find this chapter a useful supplement to their course work in econometrics and economic theory. One minor point, Nerlove's criticism of C. E. Ferguson's work (p. 98) does not seem justified.

The second part of the book presents some new and promising approaches to production function analysis. The chapter by Michael Gort and Radford Boddy presents a refinement of the vintage models by taking account of the fact that new capital and old capital are combined in production, and that old investment does affect the productivity of new in a direct sense. The empirical part of the study makes use of data on the electric power industry and seems to avoid many of the aggregation problems encountered in other studies. The chapter by Murray Brown and Alfred Conrad reports an attempt to explain differences in productivity in manufacturing industries using data on education of the labor force and on research and development. As the authors recognize, it is possible to raise questions concerning the data and estimation procedures used; however, the study is certainly a step in the right direction and the results reported are provocative. The chapter by Zvi Griliches presents tests of the Cobb-Douglas hypothesis and Cobb-Douglas cross section production function estimates introducing productivity variables, such as median age of employees, and proportion of females in the industry labor force. This too is a step in the right direction. The returns to scale discussion (pp. 305-7) is interesting. In the chapter by Robert Eisner some preliminary Cobb-Douglas estimates are reported; McGraw-Hill survey data are used. These data are a pooling of cross-section and time series, and as with other studies discussed above the usual dummy variable techniques seem to have been used to take account of interfirm differences and intertemporal differences. Some preliminary and not altogether successful attempts to obtain direct CES estimates using the McGraw-Hill data are also reported, but these results must be considered obsolete; much progress has been made in the area of nonlinear estimation since 1965. The remaining chapter in part II is a loosely connected three part piece by N. H. Lithwick, George Post, and T. K. Rymes. Ten years ago, when the profession was staring goggle eyed at the results reported by Solow and others this would have been considered an important work; not so today. The bulk of the chapter is devoted to the presentation and discussion of total factor productivity ratios for Canada. The results reported are not especially surprising.

The third part of the book, on production analysis and economic policy, is one short chapter by Richard Nelson. Nelson concludes that so far empirical production analysis has not as yet contributed the detailed sort of information that policy makers might desire. However, to this we might add, policy makers will always be capable of asking us questions to which we do not at the moment have an answer.

MICHAEL D. MCCARTHY

*University of Pennsylvania*

*The Costs of Economic Growth.* By EZRA J. MISHAN. New York and Washington: Frederick A. Praeger, 1967. Pp. xxi, 190. $6.50.

This is a passionate book by a concerned participant in modern Western society, a participant who has looked carefully at the present, projected the future, and who does not like what he sees. He is also a professional economist, and the book reflects this emphasis despite its intended presentation to potentially concerned participants generally. As with many polemics, the organization is spotty, but this is more than offset by inspired passages of genuine literary merit. The contrast between this book and the tedium that many economists now produce could hardly be greater.

Two direct quotations will indicate both the flavor and content of Mishan's argument. "Sustained technological advance, . . . , tends inexorably to destroy the sources of satisfaction of ordinary people regardless of the form of economic or social organization" (p. 148). ". . . the invention of the private automobile is one of the great disasters to have befallen the human race" (p. 173). In their zeal for achieving growth targets, measured in values for goods of the standard sort, policy makers have neglected the offsetting proliferation of "bads." The emphasis on quantifiable macroeconomic policy variables is decried, but Mishan's main attention is on the external diseconomies that characterize modern economic and social interaction. In the large, these may all be classified under the congestion rubric. Such problems as motor traffic, airplane noise, air and water pollution, urban sprawl, population explosion, despoliation of natural beauty spots: all of these and others reflect grossly inefficient utilization of scarce resources. Mishan's plea is for a dramatic change in policy direction, even if this can only be accomplished at the expense of slowing down measured growth in national economic aggregates.

A modern growthman should have reviewed this book as a critic of the primary theme. I find myself largely sympathetic with Mishan's central argument as well as with many of the subsidiary strands that are perceptively developed even if many are wholly noneconomic. While I should quarrel with certain applications of externality analysis, these technical criticisms do not undermine my general agreement with the negative or critical features of Mishan's polemic.

Unfortunately, however, the book contains one major flaw. This is, put quite simply, prejudice. Mishan shares this prejudice with J. K. Galbraith, with whose *The Affluent Society* Mishan himself compares this work. Correctly sensitive to much of what is wrong with modern social organization, prejudice against the market order distorts the diagnosis and thereby diverts

attention from potentially effective cures. Mishan remains an old-fashioned Pigovian in his welfare economics, despite his acceptance of modern theoretical refinements, and, as a good Pigovian, he explains all ills in terms of "market failure." The book is liberally sprinkled with snide remarks about "laissez faire economists" and the "excesses of private enterprise." To the unwary reader, these would be interpreted to be the sources of the difficulties that are so starkly exposed.

The failure here is surely one of "government" not the "market" or "private enterprise." Until this is recognized there seems little or no point in berating "laissez faire economists." Since Frank Knight's critique of Pigou's crowded-road example, these economists have at least understood the sources of congestion problem, something that could scarcely be said of their socialist counterparts. Mishan screams for reforms; but he neglects analysis of why governments, almost universally, fail to organize the usage of *public* properties in even tolerably efficient ways. Road-street usage is only the most ubiquitous of the many manifestations of congestion. But is there a nation, state, province, or local community in the world that operates its *public* road facilities with a modicum of efficiency? In almost every specific case cited by Mishan, or earlier by Galbraith, the despoliation arises from a failure of government to establish and to enforce property rights in scarce resources. This is not, of course, so say that the establishment of individual or private property rights in the ordinary sense is the most desirable means of securing efficiency in each instance. The relevant point to be emphasized is that the horrible examples really show almost the opposite of that which is implied by the discussion. They indicate that the market order works where property rights are identified and policed; it is where this basic function is *not* carried out by government that we observe most of the "bads" of modern society.

The constructive complement to Mishan's negativism should be, and must be, hard-headed analysis of collective decision processes. (Harry Johnson made essentially this point in his *Spectator* review of Galbraith's *The New Industrial State*.) This tends to be overlooked if the "bads" are attributed simply to "market failure" which the presumably benevolent government will fix up once it becomes informed and properly interferes. Only when the "bads" come to be labelled, not as market failures condoned by those monsters, the laissez-faire economists, but instead as gross omissions of collectivities, will concerned participants (economists and others) begin to seek explanations for paralyses of group decision processes. I hope that accentuation of the negative, especially in such passioned tones as those of Mishan, will be followed by informed, careful, and unprejudiced analysis of the institutions of public choice. Only when these institutions are better understood can elimination of the most obvious "bads" be expected. And, as Mishan acutely senses, by that time it may be too late.

<div align="right">JAMES M. BUCHANAN</div>

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*Microeconomic Analysis*. By CLIFF LLOYD. Homewood: Richard D. Irwin,
1967. Pp. xi, 273. $7.95.

This price theory text is presumably intended to be a substitute for both,
say, Ferguson from the same Irwin series as well as Henderson and Quandt
from the McGraw-Hill handbook series. I say "presumably" because its style
of presentation is a curious mixture of the low-brow literary-graphical presen-
tation of Ferguson with the middle-brow mathematical presentation of Hen-
derson and Quandt (here the last mostly reserved for appendices but consti-
tuting over one-third of the book). As a teaching technique it is clearly domi-
nated by some convex combination of these two (if not by either of them
alone), for reasons that I shall try to make clear.

The topics covered are fairly standard and comprise (i) the theory of con-
sumer behavior, (ii) the theory of competitive, monopolistic, and oligopolistic
firm behavior; partial equilibrium of product markets, (iii) factor demand
curves; partial equilibrium of factor markets, and (iv) general equilibrium in
both a pure trade and a production economy. These are reasonably compe-
tently done with some obvious exceptions. In particular two of the exceptions
merit explicit comment: The relation between production technology and cost
functions is, to say the least, very loosely explored. In fact, at one point (p.
113), after giving a heuristic argument to support the initially concave, even-
tually convex total cost curve, the author simply says "It is conventional in
microeconomic theory to draw total cost curves with this shape." While it is
true that on the next page Lloyd makes clear that he is aware that this is a
rather peculiar way to justify a model, the fact remains that such nebulous-
ness is just what explicit theory is designed to eradicate.

A second exception occurs with respect to the discussion of general equilib-
rium. This is simply that nowhere does Lloyd bring out what I take to be the
central point of general equilibrium theory, namely, that efficient or Pareto
optimal allocation is inextricably tied up with precisely the prices and behav-
ior that emerge from a competitive equilibrium (the point so nicely made in
Bator's *AER* survey article or Koopmans' first of *Three Essays*). Lloyd does
mention the Pareto optimality of competitive equilibrium; it's just that that's
all he does in this direction. Indeed, his general equilibrium model (pp. 238-
49) has monopoly elements in it! (And please don't ask how one justifies
partial equilibrium noncompetitive behavior in a general equilibrium context.)

The principal criticism of the book's coverage has to do with what's left out
rather than what's included, however. This criticism is of two sorts: First,
none of the conventional "stories" (which, I think, effectively suggest the po-
tentially wide applicability of price theory) are presented. For example, in the
discussion of consumer behavior, the reader sees nothing about the distorting
influence of excise taxes, the welfare implications of alternative indices, or the
possibility of backward bending labor supply curves. Second, and probably
more serious, a number of important topics are not even mentioned. Among
these, the most glaring omissions were consumer behavior under uncertainty,
consumer or firm behavior over time, linear programming (e.g., in motivating
the increasing, linear homogeneous production function by deriving it from a

production activity model) and the difficulties for decentralized allocation entailed by nonconvexities (e.g., increasing returns to scale) or nonmarket interdependencies (e.g., public goods).

There is a very wide divergence between the two styles of presentation in the book. In utilizing the book one simply couldn't avoid facing up to this divergence, either, as some of the basic stuff of price theory appears only in the mathematical sections (e.g., the definition of an inferior good appears in a footnote to the mathematical appendix of Chapter 1). Furthermore, the divergence is in a sense wider than that between the styles of, again say, Ferguson or Henderson and Quandt, basically because Lloyd jumps right into the n-dimensional case in his mathematical discussion. What is really gained by going from an emphasis on 2-dimensions to an emphasis on n-dimensions (where the dimensions refer to the number of consumption goods, the number of factor inputs and so on) in comparative statics? In the theory of consumer behavior, for example, all that is gained from the generalization is the possibility of complementary goods. Moreover, there is some hope of being able to teach relatively bright but immature students the mathematics necessary for the special but not the general case. (Anyone who might believe that the student can learn the latter from Lloyd's summary had better look again as, for instance, the student would find on page 39 that "A function of several variables does not always possess a unique single derivative, rather has it several partial derivatives," on page 47 a fairly obscure expansion of the determinant justified as being "well-known" by reference to a book of 1892 vintage, but nowhere in these pages even a hint about the implicit function theorem.) For this reason alone I will continue to use Henderson and Quandt for the mathematics in a price theory course as for the most part it does emphasize the 2-dimensional case. Whether the calculus approach to the structure of price theory is the best analytic approach is surely the wider question raised by this sort of text, but going into this question here would take me too far afield.

Finally, let me summarize by repeating that I think this text is clearly dominated by several others available, whether the course being taught is low-brow, middle-brow, or a mixture of the two.

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## Income Theory and Related Empirical Studies

*Golden Rules of Economic Growth: Studies of Efficient and Optimal Investment.* By E. S. PHELPS. New York: W. W. Norton, 1966. Pp. xv, 189. $6.95.

Professor Phelps is one of the discoverers of the Golden Rule of GR path, which he originally defined as the consumption maximizing golden-age path, i.e., only with respect to golden-age models. In this collection of 12 essays, he extends his analysis of the meaning of the GR concept, and applies it in various ways to both golden-age and non-golden-age models.

The book is divided into three parts. Part 1 deals essentially with the

non-golden-age models; parts 2 and 3 refer exclusively to golden-age models. Part 2 defines the GR path in relation to absorption difficulties, embodied technology and an invention possibility frontier. Part 3 extends the application of the GR concept to models which deal with investments in non-capital goods, such as research, education and even human beings (the "GR of Procreation").

The seven essays of Parts 2 and 3 are stimulating; they contain a number of original and interesting ideas, although a mathematician would sometimes like them to be more rigorously formulated.[1]

My reaction to Part 1 is, however, less favorable. It seems to me that Professor Phelps's analysis omits one of the most important properties of the GR path, namely, that it is what I have called a *critical path* [1]. In terms of capital $K$, a critical path is a path, say $\tilde{K}(t)$, not itself necessarily feasible, which has the two following properties:

(i) Every feasible $K(t)$ which satisfies

$$K(t) \geq (1 + \epsilon)\tilde{K}(t), \qquad T \leq t + \infty$$

for some $\epsilon > 0$ and $T > 0$ is efficient.

(ii) Every feasible $K(t)$ which satisfies

$$K(t) \leq (1 - \epsilon)\tilde{K}(t), \qquad T \leq t < + \infty,$$

for some $\epsilon > 0$ and $T > 0$ is efficient.

Phelps's stresses (i), but neglects (ii). This is why he introduces the Quasi-GR or Q-GR path. I find this path rather superfluous, since there is generally an infinity of less inefficient paths which also satisfy (i); moreover, a given growth model is likely to have an infinity of Q-GR paths (if any).[2]

Phelps's Generalized GR or GGR path is more interesting because it is a critical path in the sense of (i) *and* (ii), and therefore a priori useful in dynamic efficiency analysis. In general, however, it is not only a rather complicated path, but the set of parallel paths relative to which it is consumption maximizing is of no particular interest. I, myself, prefer the economically more relevant concept of the GR Strategy or GRS which equates the growth rate of capital to its marginal product at all points of time [1]. This is a critical strategy in the sense that the feasible path it defines is a critical path. However, the latter can hardly be considered as a true generalization of the GR path.

A more natural generalization of the GR path refers to models which are asymptotically capable of golden-age growth. These models are characterized by the fact that capital, production, and consumption tend to grow exponentially at the same golden (equilibrium) rate, provided only

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[1] This remark applies to the essay on the "GR of Research." The definitions of diminishing returns, diminishing marginal rate of substitution, technical progress in research and marginal-effectiveness function are ambiguously defined and this makes the subsequent analysis mathematically unclear.

[2] Let $F = F(e^{\mu t}K, e^{\lambda t}L)$, $k = (K/L)e^{m(\mu-\lambda)t}$ and $f(k, e^{(1-m)(\lambda-\mu)t}) = (F/L)e^{(1-m)\mu+mt}$. Then, the path $k(t)$ which satisfies $e^{\mu t}f_k = (\dot{L}/L) + m(\lambda-\mu)$ is a Q-GR path for every given $m \geq 0$ and $\leq 1$.

that the savings ratio is maintained constant and positive over a suffi-
ciently long period of time.

These "quasi-golden-age" models include practically all models which
are relevant in the context of long-term growth and, consequently, of
dynamic efficiency analysis. Each one uniquely defines a set of exponential
and parallel "growth" paths which are, in relative terms, ultimately reach-
able by a feasible path. This set of ultimately reachable golden-age paths
contains generally a consumption maximizing path which I call (Ulti-
mately) Reachable GR or RGR path [1]. This path is both exponential
and critical, like the GR path, and coincides with the latter in golden-age
models. Moreover, in the case of quasi-golden-age models, it is asymptotically
identical with the GGR path. Finally, in the Ramsey problem, the RGR
path plays the same role under quasi-golden-age assumptions as the GR
path under golden-age assumptions.

With regard to Phelps's "fundamental notion" of a commanding path I
must admit that I find it confusing. The concept of dominance is a mathe-
matical concept: One says that the function $x_1(t)$ dominates the function
$x_2(t)$ over $0 \leq t < +\infty$, if both $x_1(t) \geq x_2(t)$, $0 \leq t < +\infty$, and $x_1(T) > x_2(T)$
for some $T \geq 0$. Hence, $x_1(t)$ is dominant in a given set of functions defined
over $0 \leq t < +\infty$, if it dominates every function of this set. Now Phelps:
(a) restricts unnecessarily the concept of dominance to consumption-
dominance, and (b) seems to think that the concept of dominance changes
depending on whether or not the set to which it is applied is restricted to
feasible paths. Notice that his terminological distinction between a com-
manding and a dominant path is rather useless, even as shorthand nota-
tion. Indeed, this distinction does not avoid the necessity of specifying
the set with respect to which a given path is either "dominating" or "com-
manding."

The above criticisms concern essentially three out of the five essays of
Part 1. I find the paper on Factor Augmenting Progress very interesting
and clear. The paper on the Ramsey Problem provides a good introduction
to the subject, even though parts of it are somewhat obsolete. For instance,
it does not mention the fact that the existence condition, $\rho \geq (1+E)\lambda$, is
equivalent to the requirement that Euler's solution be efficient [2]. It
thus fails to reveal an interesting link among the GR path, dynamic effici-
ency analysis, and the Ramsey problem.

To sum up I find Phelps's book uneven in quality. It contains many
interesting and stimulating ideas. It is well written and its mathematics
are very simple. Unfortunately the book fails to achieve one of its acknowl-
edged objectives, the generalization of the GR concept to non-golden-age
models.

M. INAGAKI

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*Essays on the Theory of Optimal Economic Growth.* Edited by KARL SHELL. Cambridge: Massachusetts Institute of Technology Press, 1967. Pp. xii, 303. $12.50.

With some exceptions, these fifteen "Ergebnisse eines M.I.T. Seminar's" are exercises in the Pontryagin technique of optimal control. As such they were not only useful to the authors who performed them but also to the reader who wants to learn how to do these things for himself. It would be quite wrong to dismiss them as "mere exercises" with uninteresting models until one has tried to do the trick for oneself. This should quickly persuade readers that they have something to learn.

It is of course not possible to give detailed attention to each of the papers here. Instead I propose to offer some general comments of relevance to a whole group of the essays and then say something more specific about one or two of the others.

Very little is said by any of the authors about the choice of maximand. Indeed there is something of an unseemly haste to get down to the Hamiltonian. But it is not true that the valuation question throws up no interesting technical problems or that it must always end in inconclusive metaphysics. For instance it is instructive to construct extreme examples of technologies, etc., to test the reasonableness of say the "Benthamite" social value function, and there are interesting things to say on the question of additivity. Apart from this one is much put off by wide use of a valuation function linear in consumption per head (Shell, Nordhaus, Bruno), although this is sometimes rectified in an appendix. Not only is there nothing to be said for such a valuation, but it sometimes confuses the issue. Thus in the splendid paper by Bruno where the production set is a finite cone, one cannot without additional work be sure whether a particularly odd phase of the optimum trajectory is due to the technology or the silly valuation. The desire for concrete results seems no excuse for asking us to contemplate with equanimity long stretches of time where no one eats at all.

Lastly in this connection, it is worth noting that none of the authors shows any interest in the puzzle of who is supposed to do the valuing. Twenty years ago this was at the center of interest to welfare economists. In the optimum accumulation context, this problem gets a peculiarly interesting twist. For even if we opt for a dictator, he cannot opt for immortality. Should one not enquire into the course of rational action with consequences into the far future, when the valuation of one's successors is not known?

Once one has chosen a maximand, one looks for a problem. Shell chooses one- and two-sector neoclassical models with exogenous technical progress, Sheshinsky allows learning by doing, Nordhaus is concerned to choose the

best innovating activity in the context of a Kennedy-Weizsacker model, Ryder investigates the optimum trade of a country facing a less than perfectly elastic demand for its exports, Bardhan, the optimum policy for foreign borrowing, (with foreign assets per head entering negatively into valuation), Chauduri considers an investment transportation model in a two-region economy and Chase the optimum choice path for leisure and consumption in a Ramsey model. Bruno, as already mentioned, studies an economy with a "finite spectrum of techniques" and Marglin the problems of a simple labor surplus economy. These last two papers have the most economics, and to me were by far and away the most interesting of the group just mentioned. It is not that the other papers were not very well done. It is simply that one's interests are more engaged by exercises with "relevance potential" than by those without

Marglin's paper is not really concerned with Pontryagin problems at all. He considers a world which is forever in labor surplus and where the choice of technique must be once and for all. Since labor must be paid a subsistence wage, the choice of technique determines the investible surplus. If we choose a technique employing one extra man the gain is the current marginal social valuation of the subsistence wage. The loss is the fall in the maximum (present value) of all future utilities due to the reduction in investible surpluses (and so power to employ labor), if the wage exceeds its marginal product. The latter must be true for an optimum path where loss and gain are equal. This leads to a simple and appealing investment criterion. To "Pontryaginise" this problem (recently very nicely done by Dixit), we need to allow a continuous choice of techniques and also the possibility that capital accumulation will catch up with the labor supply. But we know in advance what will happen. When the capital stock is sufficiently high just to employ all labor, we shall not in general wish to do so, because then there would be nothing to invest in the future and we are in general willing to trade some current for more future consumption along a path of steady consumption. Hence full employment will only take place when it is consistent with some surplus. Thereafter we are in familiar waters.

This leads me to the second general point I wish to make. Many of the most interesting qualitative conclusions come from the Maximum Principle directly and not from the detailed computation of the path. This is true for instance for the optimum subsidy for learning by doing, for the tax on foreign lending when the returns depend on the amount done and on the relationships between various own rates. Moreover it is known that the singularity (if there is only one) in the space of the state and shadow price variables is a saddle point or totally unstable. All this is a lot of information, without computing in detail the various phases of the optimum trajectory. The latter is not only tedious, but also hard to do when the phase space has more than two dimensions. Is it worthwhile restricting oneself, as so many papers in this volume do, to just those simple models which allow one to draw the optimum trajectory? And if so, should we have not been given some guidance how to compute an actual path?

The only paper in this series where the various phases of the optimum trajectory were not fairly obvious is Bruno's. For he investigates the question,

admittedly in a restricted context, of whether on an optimum trajectory the economy will encounter "double switching," and finds in the negative. This is a very nice result and it is to be hoped that we shall soon also have the answer for more general cases. (He also makes good use of the "saddle point" property mentioned above.) But this is the exception; elsewhere we are not surprised that the linear valuation function leads to phases with zero consumption or that in a two-sector model with fixed techniques similar extreme phases may occur. Our intuition by now is sufficiently well developed to be able to deal easily with cases where either the valuation or the constraint set is not strictly concave.

The last general point to be made is this; although some of the papers discuss the question of taxation policy (e.g., Sheshinsky, Bardhan) required for an optimum path, it is fair to say that most of the authors are not interested in the question of available instruments. Thus no one tells us how the economy is to be made to save the optimum amount each time, nor how we are to direct its investments in the right directions. These are clearly questions at once of some importance and relevance to the topic under discussion.

Finally in connection with this group of papers there is a slight technical puzzle. Without exception they use the Pontryagin Principle, which is known to be necessary but not sufficient for an optimum. But for many of the problems a straightforward "Kuhn Tucker" approach (integrating by parts) and the transversality condition give both a more familiar and more direct line of attack. It is odd to find that none of the authors shares this view.

The volume also contains papers not directly concerned with detailed optimum policy in particular models. Cass and Yaari in an exceptionally fine paper discuss the problem of Pareto efficiency and optimality in the context of a model with "life time saving." A related piece of work by Meade appeared too late for them to consider. In such a world there are in general a number of possible steady states, some with an interest rate below its golden rule value. It is easy to show that, whatever the rate at which households discount future utilities, the golden rule rate of interest will ensure flow equilibrium; i.e., savings equal to investment. However, except for a fluke the economy will not be in asset equilibrium at the golden rule, while for all other steady state interest rates, asset equilibrium is assured. (From the budget constraint: $w + ra = c + na$ in steady state, where $c$ is consumption per head, $w$ is the wage, $a$ is assets per head and $n$ the growth rate. In flow equilibrium $w + rk = c + nk$ where $k$ is capital per head. If $r \neq n$ so $w \neq c$, $k = a$.) It is thus possible that the steady state will have more than the golden rule capital per man, a state of affairs we know to be inefficient. Cass and Yaari show that if into this economy another nonproductive asset is introduced, and some of it is held in steady state, then the latter is efficient. (They invoke an efficiency criterion developed in the appendix.) They think of this extra asset as money, but since apparently it has no role in mediating transactions, this must be taken as poetic licence, although there is no doubt that they have discovered an argument which will find its place in an eventual monetary theory of the future.

There is however an important difficulty with the foregoing analysis. Cass

and Yaari are concerned with competitive growth equilibria consistent with
perfect foresight on the part of agents. To demonstrate this for arbitrary ini-
tial conditions and many sectors may be difficult. But one conjectures that it
will be possible in those cases where one can make use of Kurz's suggestion
and view the economy as if it were maximizing some Ramsey integral. But
this in turn has a serious drawback. Since individuals have finite lives and
leave no bequests, they formulate expectations over their lifetime only. If the
Kurz procedure is possible then there is only one set of expectations out of
innumerable others, on the part of the first generation, which will allow a com-
petitive path to fulfill the expectations of all future generations. It is hard to
take seriously the view that the first generation will hit on these. Thus even if
all infinite competitive growth equilibria have asymptotic balanced states (p.
248), it is quite exceptionally heroic to suppose any economy to be in such an
equilibrium.

Matters related to the foregoing are discussed in two papers by Samuelson.
In the first he discusses the problem raised by myself that, in a world with
heterogeneous capital goods, equilibrium paths with myopic foresight do not
in general converge on the steady state and that initial expectations have to
be specified arbitrarily. In doing so he shows that he understands the econom-
ics of the problem much better than I did and makes an ingenious suggestion
for proving this sort of proposition for Neumann models with some savings
proportional to income. His conjecture (p. 226) that the steady state will al-
ways be a saddle point however does not seem correct for a descriptive savings
function. It is true that the intertemporal efficiency conditions strongly point
to this but the rule-of-thumb saving behavior makes it not possible to prove
such a pleasant result. In his second paper Samuelson shows that if the valua-
tion function values not only consumption per head but also the number of
heads $(LU(C/L))$, then for any finite program, the optimum path will be near
the path where capital has a zero marginal product, and since population is
growing, the capital stock for most of the time will be in excess of its golden rule
value. I am not clear why he calls this a "refutation" of the view that a path
which permanently has more capital than the golden rule amount is inefficient.
This latter theorem is of course not meant to enable us to recognize any past
path as inefficient, but rather to prevent us formulating bad plans for the in-
definite future. As such it is probably not of great practical significance, but it
seems worth having.

The book concludes with a technically very able proof by Ackerloff that the
equilibrium paths of a single-sector putty clay model converge on the steady
state.

This review, fairly long though it has turned out to be, cannot take account
in any satisfactory way of many felicities of analysis of individual authors, for
instance the ingenious procedure adopted by Nordhaus to deal with quite a
hard-looking difficulty. Nor is there space to document such views as that
two-sector models are best analyzed by means of the dual (unit cost) func-
tions and that even then they are probably not worth the effort. But I hope
enough has been said to show that, whether one approves of individual con-

structions or not, this is a most stimulating and useful book and that it contains some things which are first rate and important.

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## History of Economic Thought

*The Years of High Theory: Invention and Tradition in Economic Thought 1926-1939.* By G. L. S. SHACKLE. Cambridge: University Press, 1967. Pp. viii, 328. $7.50.

The 1930s clearly represent a vintage period, a really great burst of creative activity in economic theory. Professor Shackle's latest book undertakes a review of that period and succeeds in transmitting its excitement to the reader. In short, the author has produced another work meeting the high standards we have come to expect of him.

The book deals with five areas of theoretical innovation: imperfect and monopolistic competition, indifference-curve analysis, the formal dynamics of Harrod, Frisch and Samuelson, the Leontief input-output analysis and, of course, the Keynesian Revolution. It is only just that the bulk of the volume is devoted to the last of these. On each of these topics Shackle provides us with a discussion of forerunners, he describes the accomplishments of the new theory itself, and (throughout) offers a variety of penetrating observations and comments of his own.

Though the discussions of predecessors are illuminating and often call to the reader's attention materials of which he was previously unaware, the author makes no attempt to be exhaustive. In the case of the central ideas of the Keynesian analysis, an attempt at a reasonably comprehensive analysis of forerunners would clearly be hopeless at least within the confines of such a slim volume. Nevertheless, the author manages to provide a variety of most interesting materials even here. For example, he brings to our attention a discussion in 1896 of Kahn's multiplier analysis by Julius Wulff, a member of the Danish Parliament, and one by N. A. L. J. Johannsen, a German writer, in 1898. In the process, Shackle also manages to give us some feeling for the human emotions that go into the process of discovery, recording for example Kalecki's reaction when he arrived in England in 1936 only to find that Keynes had anticipated his ideas—"For three days I felt ill," Kalecki recollected.

Shackle's rather careful report on earlier writings on monopolistic competition does, unfortunately, suffer from one serious omission. Professor Viner's contribution is overlooked altogether; not only the discussion of marginal revenue in the noted 1931 article "Cost Curves and Supply Curves," but also his very detailed analysis of product differentiation (in which he makes explicit use of the term) in a paper written in 1921 [1].

One can quibble on other matters, occasional minor theoretical slips, but it is surely unworthy to labor such trivial shortcomings of which no work can be

completely free. On only one substantial matter do I take issue with the author. Shackle makes a great point of what he considers to be the central premise, "the very bed rock" of the Keynesian model. He tells us again and again that the critical element in the analysis is its recognition of uncertainty and its consequences for expectations. I am most unhappy with any attempt to identify *the* central premise of such a complex body of analysis. A theoretical model must rely on a number of conditions which are necessary for its functioning. It is all too easy to single out some one of them as the critical contribution, but the process must remain inherently arbitrary. This comment applies, for example, to those who have suggested that stickiness of wages is the key element in Keynes, and it must for similar reasons be relevant for Shackle's candidate for the post.

But we must get back to the central matters of the volume, and not lose sight of Shackle's accomplishment in redirecting our attention to a period of great theoretical contributions. The waves of productivity that have characterized the history of economic analysis are indeed rather remarkable—the classical period, the period of the marginal revolution and of the birth of general equilibrium analysis, and then the period of Shackle's book, the very fertile era that spanned the great depression. This last period in fact extended beyond the time examined in the volume, and included such exciting postwar developments as activity analysis, much of the theory of econometrics as we know it today, and the theory of games. It seems equally clear that this outburst of discovery has come to a halt in the last one and a half decades in which much useful work has been done, but most of it hardly revolutionary. Since we do not understand the origin of the waves of creativity, it is probably fruitless to speculate on the likely duration and causes of what we may term (perhaps to comfort ourselves) today's era of consolidation. Yet one cannot help wondering sometimes whether the evolution of our teaching methods over recent decades does not bear part of the responsibility. Perhaps there is a trade-off between rigor and creativity on a grander scale and, if so, we may want to consider whether we have gone too far in one of these directions.

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*Economics and Ideology and Other Essays—Studies in the Development of Economic Thought.* By RONALD L. MEEK. London: Chapman and Hall, Ltd.; New York: Barnes & Noble, 1967. Pp. ix, 227. 40 s; $7.25.

In this volume Ronald L. Meek, Tyler Professor of Economics at the University of Leicester, presents a selection of a dozen essays that he has written since 1950 on a broad range of topics in the history of economic thought. The

book is an especially welcomed contribution since it makes these essays more accessible to a wider professional audience.

The relationship between economics and ideology is the general theme that Meek chooses for the book as a whole. As would be expected, the title essay focuses the most intensively on this theme. The other essays reveal concern with the same relationship, though to lesser degrees. Meek believes that ideological and analytical elements are both present in the corpus of economic thought and that some sorting-out of the two is not only possible, but also necessary. On the question of the relative strength of the ideological component, Meek stands somewhere between J. A. Schumpeter and Joan Robinson. He believes, along with Schumpeter, that the sorting-out process requires conscious effort, but does not believe, as does Schumpeter, that the process is automatic. Meek writes: "We cannot safely leave it to history to purge our economics of ideological distortions" (p. 209). Thus, for Meek, ideology is more pervasive and more complexly intertwined with economic theory than for Schumpeter. Moreover, Meek believes that to explain change in economic analysis (such as the transition from the labor theory to the marginal utility theory) *"exclusively* in terms of internal development, as Schumpeter tends to do, is to explain very little" (p. 209). In contrast to Joan Robinson, who says that "reason will not help" to stomp out ideological distortion, Meek believes that progress can be and has been made, but recognizes that the creation of an ideology-free economics is not an easy task (p. 223).

Meek arranges the essays into three main divisions: I, "Classical Economics" (five essays, 92 pp.); II, "Marxist Economics" (four essays, 68 pp.); and III, "Modern Economics" (three essays, 64 pp.). For purposes of review, I first would like to discuss Meek's Marxist essays and then look at most of the remaining essays.

Four essays appear in Part Two of the book under the heading "Marxist Economics." These include Meek's now well-known "Some Notes on the 'Transformation Problem'," as well as individual studies on various aspects of Marxist literature: Marx's economic method, the doctrine of increasing misery, and the falling rate of profit. On the whole, these four essays focus more on logic and analytics and less on ideology than do the other essays in the collection. With but slight redefinition of the boundaries of "Marxist Economics," other essays could have been included in Part Two. For example, his essay on the eighteenth century Scottish writers ("The Scottish Contribution to Marxist Sociology") deals with the early concepts of class structure, stages in social and economic development, and the dependence of the social system on the "techno-economic base" of the community. Meek goes on to argue that the Scottish writers provided basic ideas on these topics to which Marx fell heir. Meek's interpretative review of P. Sraffa's *Production of Commodities by Means of Commodities* might also have been included in Part Two, since Meek considers the book to be a "rehabilitation" of classical economics, and, "up to a point," of Marxist economics as well.

Four of the remaining essays can be divided, according to the author's approach, into two groupings. One such grouping, which might be termed "the

critical essay," takes the form of a broad-ranging analysis focusing on one or more books. The title essay, "Economics and Ideology," compares and contrasts J. A. Schumpeter (*History of Economic Analysis*), Joan Robinson (*Economic Philosophy*), and Oscar Lange (*Political Economy*), on the question of the role of ideology in economic theory, particularly value theory. "The Rehabilitation of Sir James Steuart' was occasioned by the appearance of S. R. Sen's *The Economics of Sir James Steuart*, which Meek uses as a springboard for his discussion of Steuart's role in the history of economic thought and of the danger broached by modern "rehabilitators" in possibly losing all sense of perspective when interpreting a past theoretical system in terms of modern theoretical categories. Meek emphasizes in the essay on Steuart that the study of the history of economic thought should "start by relating the major theories that have been put forward to the different phases of development through which the system of market exchange has passed" (p. 17). The second set of essays might be termed "the interpretative essay." Use of a big canvas that allows the author to handle broad themes and make provocative generalizations is characteristic of "The Decline of Ricardian Economic Theory in England" and "The Place of Keynes in the History of Economic Thought." In the first of these two essays, Meek examines the hallmarks of "Ricardian" economics in order to "define those parts of Ricardo's theory which did in fact fall into abeyance after 1830" (p. 55). And in the second of these essays, Meek views Keynes' contribution to economic thought in the context of the relationship of classical and Marxist economics to *The General Theory*.

Meek's book, on the whole, draws heavily on Marxist economics and on Marxist economic, social, and philosophical constructs. This emphasis is indicated by the four (or six) chapters on Marxist economics, and is also revealed in Meek's concern with value theory, class structure, and, of course, ideology. Professor Meek's early interest in value theory (cf. his book, *Studies in the Labour Theory of Value*, 1956) shines through at numerous points in this volume. While Meek employs Marxist categories, his essays are free of ideological dogmatism. For this reason, as well as for the high level of scholarship and the lucid exposition of ideas in the essays, I believe that the volume will be well received by the specialist in the history of economic thought and by the general economist as well.

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*The Trouble With Marx.* By DAVID McCORD WRIGHT. New Rochelle, N.Y.: Arlington House, 1967. Pp. 192. $5.00.

The trouble with David McCord Wright is that he is still writing cold war tracts, when most of the economics profession has turned to more scholarly endeavors.* He says in the preface that he "is a believer in capitalism," and "the faith of the true believer has little room for objective analysis of oppo-

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* *Editor's note:* This review was written before knowledge of the death of David McCord Wright on January 6, 1968.

nents." Furthermore, he admits in the preface that he "will deliberately omit details" and "will furnish a simplified book about Marx." This is an understatement of his crude, hardly recognizable, caricature of Marx's ideas.

Following these precepts, the book has no index, less than ten footnotes, and very few quotations. The organization is illogical and sometimes imperceptible as Wright jumps in one paragraph from philosophical concepts to economics and back to philosophy. It is hard to isolate a specific argument, not only because they flow together, but because his attacks are largely by innuendo or are red herrings thrown at straw men. Furthermore, he reserves his strongest attacks for non-Marxist social democrats, Keynesians, and all other "planners" who would subtly lead society away from pure capitalism.

To the extent that he meets Marxist theory head on, his main points concern (1) Marx's historical approach, (2) the withering away of the state, (3) the falling rate of profit, and (4) imperialism. On the first point, he attributes to Marx the crude theory "that technology determines economics, and economics determines history." Yet all Marxist writers, from Marx onwards, discuss technology only as one interacting part of the economic base, often being held back for centuries by the relations of production, as in Roman slavery. And all but the most vulgar Marxists emphasize that the entire economic base is in a functional relation with the social superstructure, determining, but also being determined at any given time.

A great many pages are spent arguing that even in a communist utopia the state could never wither away because even unselfish men, who are in agreement on ends, can come to blows on means. Leaving aside this distant and hypothetical society, Wright says almost nothing about the important and presently relevant question: is a socialist economy likely to produce more or less political democracy than a capitalist economy?

The strangest part of the book, however, is the economic section. It centers around the theory of the falling rate of profit, which Wright claims to be "at once the main base of Lenin's theory of imperialism and of Marx's theory of capitalism's inevitable end." That, however, is a vast overstatement. Lenin never mentions the falling profit rate theory in his long pamphlet on *Imperialism*. Marx uses many other economic arguments, and certainly does not believe in a purely economic or mechanical failure of capitalism; rather, Marx emphasizes the very social trends that Wright claims he ruled out. Many modern Marxists, such as Baran and Sweezy in their *Monopoly Capital*, even argue that the rate of profit has a long-run tendency to rise, and that this tendency is related to imperialism and the end of capitalism.

An additional trouble with Wright is his confused explanation of why the rate of profit falls. He has Marx arguing that capitalist competition causes "higher wages and lower prices." This is quite foreign to Marx's explanation, which focuses on a rising trend in capital intensity, and even mentions *lower* wages as an offsetting factor.

Lastly, Wright attacks Lenin's notion of the economic basis of imperialism, and argues instead a quaint version of the white man's burden. Thus, the British East India company did not desire political domination to protect its plunder of India, but rather made war or annexed territory only in order to

restore order. "In fact, in order to bring industrial progress to all of the underdeveloped countries, it was necessary at first to have a certain amount of juridical order imposed from outside. How else could democracy and progress have reached Africa and Asia?" Wright's theory of inferior colonials aided by altruistic imperialists seems a strangely naive bit of racial mythology in the present day.

It is impossible here to list all of the misinterpretations of Marx in the book, but mention must be made of the biographical sketches at the end of the book. These charming portraits inform the reader that Marx was "insanely vindictive" and "boorish," that Lenin was "ruthlessly powerhungry," and that Engels authored several "fairly flatfooted" works. One wonders why Wright stooped to make the ten thousandth attack on these inferior intellects.

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*Politische Oekonomie—Geschichte der wirtschaftspolitischen Ideen von Platon bis zur Gegenwart.* By EDGAR SALIN. Tübingen: J. C. B. Mohr (Paul Siebeck), 1967. Pp. viii, 205. DM 16; paper, DM 12.50.

This volume, published in memory of the once famous cycle theorist Arthur Spiethoff, presents the fifth edition of a book which made its first appearance· in 1923. Main theme of the different editions has been the relationship between theory and empiricism, cultivated by the author conspicuously in favor of the philosophical, historical, almost humane approach to economic problems with economic analysis having little chance to develop. To Salin, economic science is "political science." The political element in economics, he maintains, is to be recognized particularly nowadays when people like to hide behind apparently unpolitical formulas and "scientific" reassurances.

The work is classified in four parts: I. Prehistory (*Vorgeschichte*), treating the Grecian and Roman contributions to economic thought; II. History (*Geschichte*), encompassing mercantilism, the "political science"; physiocracy and classicism, the "systematic sciences"; and socialism and historicism, the "evolutionary sciences." Section III discusses what it commonly called modern economics. In the Excursus some of the well-known contributors to economic thinking are grouped together according to their similarities or differences in methodology. Describing the economics of the ancient world (Metaeconomics), Salin consults mainly political and ethical writings of the old writers instead of using more realistic material. Consequently, he actually reinforces the fictitious undertones of Grecian economic thinking when he is trying to clarify it. On the other hand, Aristotle's economic concepts which have fertilized later developments of thought and therefore offer themselves as basis for a more objective evaluation of the Grecian contribution are not appreciated at all by the author. The Middle Ages (*das katholische Europa*) are treated in approximately the same manner as we find them in usual textbooks. It speaks for the philosophical-speculative attitude of Salin when he emphasizes, perhaps overly so, the interesting value concept of the medieval school that "things·are not valued according to the dignity of their natures." It may have been the timeli-

ness of this quasi-socialist notion which was on the author's mind, the idea that "just" price is a matter concerning the whole community, and is not merely the result of evaluations between buyers and sellers. In defining mercantilism as a "system of national power," Salin follows Schmoller's subcutaneous diction. In the same breath he unduly claims a mercantilist economic theory, one that was concerned with "historical and political relationships" similar to F. List's perception in his theory of productive forces. No mention is made of newer interpretations which accept that mercantilism actually recognized and wanted to make the motor of self-interest work to foster economic growth. The physiocrats are criticized for interpreting the dynamics of economic forces as being basic, natural, eternal. To Salin, economic forces are historical phenomena (*anschauliche elemente*). Adam Smith is censured for being mechanistic; Malthus and Ricardo for having instigated a major split within classicism on whether economics ought to develop toward pure theory or *anschauliche* theory. Ricardo makes the grade as far as his analytical ability goes, but "to him who accepts that economics is and has to be sociology, *Gesellschaftslehre*, Ricardo's method must seem like anatomizing a body alive." Socialism and historicism are grouped together as "evolutionary sciences" whereby the author apparently understands by evolution an objective process within the sphere of "real" history just as Marx did. Generally, Salin likes to make a case for Marx, although not for Marxian economics. It is in tune with the author's endless verbal portraitures, and frequent platitudes when he writes not of the analyst Marx but of the impact of his work, ascribing the reason for this to Marx's ability to "historically" demonstrate the phenomenon of class struggle, exploitation, and the disharmonies of society. When Salin makes analytical attempts, he fails. For instance, in defending the labor theory of value which Salin does on old, worn-out grounds, he is calling on Galiani for support, while, unfortunately, according to the Italian writer it is not labor costs which determines value but rather value which determines labor costs.

As to the aims and method of the historical school, Salin adds nothing to what has been known to generations of students. His major point of criticism is the same as it was back in 1923, namely Schmoller's "detailed . . . historical research." Unjustifiably, he ranks V. Thuenen, whose method was rigidly theoretical, among the historians. One cannot but doubt that the author means what he has been critically remarking about the historians. His book is biased in favor of "organic" terms and against rationalism, "mechanics." His dream is with some theory-connected historicism which "might be emerging in the last quarter of the century." This prophesy expresses what Salin considers the main methodological winning-post of economic science, namely the "theoretical penetration" and "empirical-observational" (*anschauliche-systematische*) structuring of historical data to better comprehend the functioning of the real economic world (*lebendige politische Oekonomie*).

Whoever, in Salin's opinion, has "happily" combined deduction and induction in explaining the economic world is a "predecessor," one who pioneers what future generations will practice, such as M. Weber, Sombart, Spiethoff, Keynes, I. Fisher, F. Knight. On the other hand, M. Weber's attempt to

remove value judgments from economics is bemoaned as "negative success" because it released a rapacious rationality with no room for the "powers of life" (*Lebensmaechte*), Spiethoff is referred to as a shining example that a combination of pure and "historical" theory is possible. Salin does not mention, however, that Spiethoff himself thought these two should not be combined.

A total view of the economic world possible only by marriage of "observational" theory and theoretical analysis, so Salin says, had been prevented by the "barbarism of specialization." In this category he seems to be grouping nearly everybody from the marginalists to the mathematically inclined in economics, the "technical theorists." Salin believes that unifying forces such as technology and the common interest in economic development entail opportunities for "true political economics," i.e., an all-encompassing, historical and theoretical approach to economic problems.

The book in its original version may have been a contribution in the 1920s when the *Methodenstreit*, the struggle for the "correct" approach in economic analysis, was still occupying beyond reason able people who could have invested their time more wisely. Today, the revised book cannot be taken as a piece of literature which makes economic education attractive and improves structure and content of economic science. The volume gives testimony of a learned man who has assimilated much knowledge; however, the value of many of his conclusions cannot be seen by a world he himself does not trust anymore.

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## Economic History; Economic Development; National Economies

*Industrial Retardation in Britain, 1880-1914.* By A. L. LEVINE. New York: Basic Books, 1967. Pp. x, 201. $6.95.

The study of industrial change by economists knows few geographic or temporal limitations. The study of industrial retardation is another matter. Great Britain from roughly 1880 to the first world war presents something of a classic case. It was "a period that witnessed a marked quickening in the pace of technical and organizational change in the manufacturing industries of the major industrial powers. How did British manufacturing industry perform when there were now, indisputably, two other great industrial powers?" (p. ix). The question has commanded considerable attention from economists like Hobson, Marshall and Veblen, as well as journalists, politicians, trade unionists and representative government committees. It remains relevant for those who today would better understand the causes of slow British growth in the recent as well as more distant past.

By industrial retardation Levine means simply the lag of British industries, in terms of technology and organization, behind those of the United States and Germany. Evidence of such a lag is offered in an introductory chapter. Some of it is quantitative and includes data on levels and growth of factor

productivity. Some of it is qualitative and makes the point, among others, that Britain was not in the forefront either as a *de novo* innovator or as an adopter of innovations.

A second section of the volume examines systematically the nature of British weaknesses in technology and organization. Regarding technology, the argument stresses four factors: the relative lag in mechanization; the slower pace of production; a comparative neglect of electrification; and the backward state of the iron and steel industry. Regarding organizaton, the strategic shortcomings are seen to lie in a proliferation of small-size plants, with insufficient vertical integration and inadequate specialization of labor and limitation of variety. These arguments are not new, but have often been made in the past by diversely situated observers. Levine has usefully systematized and ordered them, along with supporting evidence, in a way that facilitates understanding and evaluation.

Explanation is the task of Part III. This section dominates the book and will, for most readers, hold the greatest interest. In a conscientious assessment of British enterprise and management and of the socio-economic framework in which it functioned, the author comments on the "sheer inertia, excessive confidence, and complacency" of industrialists, on their "abysmal lack of interest . . . in science and research" (p. 69), on social immobility and a "too highly developed class consciousness up and down the social scale" (p. 72). He cites the disdain of industrial opportunities and careers by the educated upper classes, accompanied by barriers to such opportunities facing the lower classes, and he scores the school and university curricula for neglecting technical and science training and other forms of education that might contribute to professional management.

The trade unions come off a bit easier. It is almost natural that they should, for unlike their employer opposites, they are not expected to play the role of advance scouts and initiators in industrial change and growth. Yet one detects in Levine's approach to labor a predisposition, not apparent in his earlier discussion of management, to grant it the benefit of doubts. Of the allegation that unions restricted output, he asks whether the evidence was "incontrovertible" (p. 85), and of the contention that they retarded technical advance, he asks whether the case is "entirely conclusive" (p. 96). However, balance is redressed somewhat in his summing up on labor's role, wherein he affirms some justification "for the belief that Britain's working classes formed (and continue to form) the most conservative stratum of an essentially conservative society" (p. 97).

Levine's framework is not tightly theoretical, nor does his argument move from narrow premises to certain conclusions via any delimited, sharply defined hypothesis. Rather his approach, which proceeds by identifying factors of possible relevance and bringing to bear on them both quantitative and qualitative evidence, is essentially a pragmatic blend of theory and history. In view of the breadth and complexity of the phenomenon under study, it is doubtless a suitable approach—one that permits sweep, an appropriate degree of analytic flexibility, and persuasive if not always irrefutable judgments.

A useful summary chapter not only records the author's own views on Brit-

ish retardation, but through these views probably renders a fair account of such consensus as may currently exist among observers of the problem. Overall, the volume provides a valuable survey and summing up on a long-standing, important, much debated and vexing issue. The conclusions which, after all the evidence, Levine settles upon, are not encouraging with respect to Britain's capacity for a markedly better industrial performance in the years to come.

MARVIN FRANKEL

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*An Economic History of Western Europe, 1945-1964.* By M. M. POSTAN. London: Methuen & Co.; New York: Barnes & Noble, distrib., 1967. Pp. 382. $7.50; paper, $4.00.

Few economic phenomena have been so intensively analyzed as the surge of economic growth in the industrial, more-or-less capitalist, countries in the period since World War II. Leaving aside the perennial special case of Japan, the noted contrast has been that between western Europe's recent performance and its closest analogs in time and space: the postwar United States and Europe itself before 1939. Now, Professor Postan gives us a historian's survey designed to provide the perspective that nearness, direct involvement, and the very flood of commentary may have obscured. The present book is roughly contemporaneous with a new generation of more technical and narrowly focused analyses of the European growth experience, and Postan acknowledges familiarity with the recent contributions of such writers as Maddison, Denison, Shonfield, and Kindleberger, although the vagaries of the publishing process make it difficult for him to use their findings systematically.

The preface refers to the book as a semipopular treatise. Its first part, entitled "Growth," begins with a summary of the record of the past two decades, usefully drawing on many countries while emphasizing the uniformities in Europe's experience rather than this miracle or that crisis. This is followed by a critique of some economic causes that have been put forward to explain rapid growth. Here are to be found those more technical passages that justify the qualifying "semi" in the author's own presentation of the book. The second part describes "The Changing Shape" of agriculture, of industrial ownership and management, and of the ways people live and work.

Postan's book contains many good things, a reflection of the breadth of his experience with economies and economics. He combines a constant awareness of the long term with a concrete and "microeconomic" concern for technology and managerial decision-making. He draws both on the factor-price approach of Western production-function analysis and on Marxist class views, and yet retains a feeling for labor and capital as provided by and for people. There are good summaries of the literature stressing the positive role of planning and international trade, and a more original view of the genesis of "Growth-manship" as a conscious policy. The section dealing with social changes in the labor force, based on the declining importance of craft skills and the increasing role of general and vocational education, is stimulating. Finally, one may mention the analysis of change in the control of industry and commerce,

where Postan shows that the old capitalist class has produced technocrats as often as it has given way to outside professionals.

The economic analysis of the reasons for rapid and sustained growth is a good deal less successful. It is not merely that the arguments regarding the role of relative factor prices in investment and innovation, say, are inconclusive. This is to a large extent inevitable in view of the limited data available. But Postan does not, one feels, give such arguments a fair trial or use them to throw a sharper, if unbalanced, light on the scene. He believes that innovation, and the entrepreneurial dynamism that promotes it, are the key explanatory variables, and approaches other explanations largely with a view to clearing the field so as to leave his champion alone and unchallenged in the lists. It is no very hard task for him to cast doubts on the validity of alternative hypotheses, especially taken one by one.

Moreover, the edge of the economic argument is blunted by the attempt to play down the lag in the United Kingdom's economic performance, useful as this emphasis may be in balancing certain overdrawn contrasts between Britain and the major Continental countries. However, accidental or exogenous causes are given unfortunately large weight in accounting for the case of Britain, especially in the crucial area of export performance. Nor is the evidence always presented with entire objectivity. On pages 72-75, Postan argues that exports did not grow so slowly after all, and that their composition shifted in a progressive direction. But the key growth rate for British exports of 1.8 per cent per year (1948-1962) is not mentioned until page 91. To be sure, the trend in exports was much better than in the interwar years, but Britain participated fully in the changes that promoted increased postwar trade, especially in capital goods and other highly technical manufactures. Rapid growth in the trade of other industrial nations should have been reflected in demand for British goods. Trade begets trade, and Britain's market opportunities were of a different order of magnitude from those of the dark thirties. It follows that a harsher verdict must be given regarding Britain's ability to improve productivity and, especially, to reallocate resources.

Despite these difficulties, which may put off economists who naturally look to the most technical passages for the substance of an argument, Postan has produced a readable, balanced, and informative book that will be useful to students, beginners and professionals alike, of postwar Europe and of change in industrial societies.

PAUL M. HOHENBERG

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*Export Instability and Economic Development.* By ALASDAIR I. MACBEAN. Cambridge: Harvard University Press; London: Allen and Unwin, 1966. Pp. 367. $6.95.

This is an important book because it attempts an empirical verification of widely held views on the detrimental effects of fluctuations in exports of developing countries on their economic performance. The book falls broadly into two parts. The first is essentially statistical and analytical while the second is concerned with alternative stabilization policies. The author's

attitude toward policy, particularly to possible international commodity stabilization schemes, is heavily influenced by the generally negative results of his statistical analysis which indicated, apparently, that export fluctuations have no significant adverse effects on economic development. The statistical analysis, which thus constitutes the core of the book is, however, generally not convincing.

The statistical and analytical part is divided into a discussion of the short-term consequences of export instability for the economies of developing countries (Ch. 3); the longer-run effects of export instability on the rate of growth in GNP (Ch. 4); and a series of case studies of fluctuations in exports, and in the internal economies, of a number of developing countries.

The analysis of the short-term consequences of export instability focuses on the relationship of such instability with fluctuations in imports, in domestic fixed capital formation, in domestic prices and in monetary reserves. The author uses both cross-country comparisons and time series for individual countries but neither approach is used convincingly while, at crucial points in the argument, the statistical evidence adduced appears to be in direct contradiction with the author's conclusions.

The discussion of the relationship between fluctuations in export earnings and in gross national product is based largely on annual statistics for eleven developing countries, generally covering the period 1950–60, though the period is considerably shorter than this for some countries. After making a crude adjustment for trend in both export and income series, the author analyzes the relationship between annual changes in the two series in two ways. The first consists of counting the number of years in which the changes were in the same direction. With no time lag, there were 61 cases out of 99 in which exports changed in the same direction as GNP while, with a one-year lag, the score was only 45 out of 89. The second test was to relate the absolute annual change in GNP to the absolute change in exports over periods in which export earnings suffered a sharp decline. The author finds that, apart from two cases, the ratio of income to export change falls within the range of 0.26 to 2.62, with five cases below unity and five slightly above. His conclusion is that, in these highly trade-oriented countries, fluctuations in GNP appear to be quite heavily dampened (p. 68). Later he states, even more categorically, that in "most cases fluctuations in income do not appear to be at all closely related to fluctuations in export earnings. . . . This lack of relationship cannot be explained simply by the relative quantitative importance of exports in their economies for, even with countries chosen for high ratios of exports to gross national product, no correlation can be found" (p. 339).

Neither of the author's tests is, however, statistically meaningful; the first because it implicitly assumes that all changes in the same, or opposite, direction are of equal importance; the second because it relates generally to only one or two years in which random factors can considerably distort the underlying relationship. It is, indeed, surprising that Professor MacBean, who uses single equation regressions at many other points, has failed to use such regressions to test one of his central conclusions. Had he

done so, he would have found that, despite his explicit assertions to the contrary, a close connection does, in fact, exist between fluctuations in exports and in GNP in about half of his sample of developing countries. Using his own trend-corrected series, the results for 5 of his 11 countries are as follows (using a linear equation $Y = a + bX$, where $Y$ represents fluctuations in GNP and $X$ fluctuations in exports):

|  | $a$ | $b$ | $R^2$ |
|---|---|---|---|
| Burma | 0.03 | 1.16 (0.02) | 0.90 |
| Ceylon | 4.34 | 1.41 (0.09) | 0.74 |
| Congo (L.) | 0.36 | 1.01 (0.07) | 0.67 |
| Rhodesia and Nyasaland | −0.21 | 0.86 (0.07) | 0.58 |
| Cuba | 25.2 | 1.75 (0.40) | 0.56 |

The relationship is less close for the other countries; on inspection it appears that this is due, in most cases, to special circumstances in one or two years, which obscure the underlying relationship. For one country, Honduras, the time lag between fluctuations in exports and in income appears to have lengthened over the period covered by MacBean's analysis; if allowance is made for this, the association is reasonably close.

It is, admittedly, difficult to make any valid generalization from such limited data but, so far as it goes, the data presented in this book would seem to support the view that short-term variations in national income in many, probably the majority, of developing countries are associated with variations in those countries' export proceeds.

The discussion of the relationship between fluctuations in exports and in investment is largely based on data, for the decade 1948–58, for ten Latin American countries. Unfortunately, the data for the two series are taken from different sources, the investment data being in constant prices in domestic currencies, while exports are valued at current dollar prices. This valuation discrepancy could be important when the relationship studied is a rather difficult one to establish. In the present case the author succeeds in establishing "a fairly consistent relationship" between export fluctuations and fluctuations in imports of capital goods; and also "a statistically significant relationship between [fluctuations in] capital goods imports and investment" (p. 72). One would have thought that these two relationships taken together would imply a third, namely between fluctuations in exports and in investment. But the author assures us (p. 73) that "rank correlations for each country . . . reveal very little consistent relationship between export fluctuations and fixed investment." There would seem to be some inconsistency in analysis here.

In the course of his exposition, MacBean throws some useful sidelights on the relation between fluctuations in exports and fluctuations in internal prices and in the monetary reserves of developing countries. He shows that changes in reserves have generally been compensatory, though the amount of the changes in reserves has seldom corresponded closely to the changes in export proceeds. He does, however, suggest (p. 81) that "the typical under-developed country holds rather higher reserves, around 20 per cent more than the typical developed country." This statement is based on

comparing the ratio of reserves to imports in the years 1956–57. However, a more meaningful indicator of the adequacy of reserves would be their ratio to the trade balance, or to the average fluctuation in the trade balance. Taking 25 developing countries and 14 developed countries for which the relevant data are published in *International Financial Statistics*, their average reserve ratios for the period 1960–66 compare as follows:

|  | Ratio of Reserves (1960–66) to: | |
| --- | --- | --- |
|  | Average Trade Balance | Average Annual Change in Trade Balance |
| Developing countries: |  |  |
| Arithmetic mean | 6.7 | 7.6 |
| Median | 2.2 | 2.2 |
| Developed countries: |  |  |
| Arithmetic mean | 12.7 | 20.8 |
| Median | 3.3 | 12.9 |

On either of these criteria, the level of reserves held by developing countries is far less adequate than are those held by developed countries.

The remainder of the author's discussion on the short-term consequences of export instability consists of a series of ingenious explanations of why GNP should not be sensitive to fluctuations in exports of underdeveloped countries. Some of these explanations, such as the high marginal propensity to import and the stabilizing expenditures of expatriate firms, are clearly of importance in the economies of certain countries. But the argument lacks conviction since its premise would not seem to have general validity.

The analysis of the relationship between export fluctuation and the rate of economic growth in developing countries in Chapter 4 is conducted entirely on the basis of cross-country regressions (though cross-country comparisons were also used in the discussion of short-term consequences, discussed above, they were essentially subsidiary to the time series analysis). The cross-country regressions showed no significant relationship between the degree of export fluctuation and the rate of growth in domestic fixed capital formation; indeed, the results indicated that, if anything, a positive association appeared to exist. The statistical analysis also revealed a positive relationship between export fluctuation and the average rate of increase in domestic prices, but no significant relationship between export fluctuation and the growth rate of national income. MacBean concludes that, while for individual developing countries, fluctuations in export earnings may have seriously reduced their ability to achieve high rates of economic growth, for developing countries in general "the evidence indicates that export fluctuation has not been an important obstacle to their economic development" (p. 127).

MacBean's analysis has, however, a number of important limitations. To begin with purely statistical questions, it is clearly vital to base the

analysis on comparable and correctly articulated series. For many of the countries included in his regressions, however, articulation is not satisfactory (for example, whereas the index of export fluctuation relates to the period 1948–58, the annual rate of growth in fixed capital formation relates to much shorter periods for many countries, often from 1950 or 1951 to 1955, 1956 or 1957). This circumstance alone could seriously affect the regression results.

A second statistical difficulty is created by including in the regressions every possible country for which data can be obtained or estimated. For a few countries, some of the variables appear so abnormal as to raise doubts about their accuracy; alternatively, if they are accurate, they would seem to constitute special cases which could reasonably be excluded. The reason for the positive association found in the regression between export fluctuation and the growth rate of fixed capital formation, for example, would seem to be largely a reflection of the inclusion of Morocco, the only country to show an absolute decline in investment over the period, in spite of only small export fluctuations, and Iraq, with an unusually high growth in investment associated with an above-average degree of export fluctuation.

Another example of how the inclusion of a few special cases affects the regression results is the author's equation for the relation between export fluctuations and the growth rate of GDP. Using data for 21 developing countries, he arrives at the following results (p. 123):

$$Y = 3.6 - 0.0082X_v + 0.4278X$$

$$(0.2811) \qquad (0.1267)$$

($R^2 = 0.4285$), where $\dot{Y} =$ rate of growth of GDP, $X_v =$ instability of importing power of exports and $\dot{X} =$ rate of growth of import capacity. This result shows that, for the developing countries included, "little or no relationship exists between short-term instability in their export proceeds and the rate of growth of their national incomes" (p. 124). However, if a few special cases are excluded, and the GDP is related to the growth in fixed investment ($\dot{I}$) rather than in import capacity, the following equation can be calculated for 16 developing countries from MacBean's data:

$$Y = 5.6 - 0.353X_v + 0.289I$$

$$(0.042) \qquad (0.159)$$

($R^2 = 0.785$). This result would appear to be a reasonably good explanation of intercountry differences in rates of economic growth. It also strongly suggests that highly unstable exports are likely to be a significant constraint on the rate of economic growth of many developing countries.

Nonetheless, it would be unwise to draw firm conclusions from cross-country comparisons such as these. Their major drawback is their implicit assumption that there is a single, unique, relationship between a given degree of fluctuation in exports and the resultant change in the growth rate of GNP for all countries. Because of differences in economic structures, in the degree of dependence of different economies on the foreign trade sector

particularly for supplies of capital equipment, and in the ways in which they adjust to short-term changes in foreign exchange earnings, the impact of a given fluctuation in export earnings on the long-term growth rate of GNP is likely to vary substantially between different developing countries. For this reason, none of the regressions presented in this part of the book can be accepted as meaningful, and the author's conclusions are equally suspect. It would seem that the only valid approach to the problem would be to analyze the effect of export fluctuations on the economic growth of each developing country separately.

MacBean goes some way in this direction in his analysis of economic developments in five countries—Uganda, Tanganyika, Puerto Rico, Chile, and Pakistan—which together constitute a well-chosen sample, exhibiting a variety of relationships between the export sector and the domestic economy. This is, perhaps, the most interesting portion of the book and the author uses the available data skillfully and with insight. He finds, not surprisingly, a variety of degrees of dependence of the domestic economy on the export sector. For Uganda, there is evidence of a systematic relationship between capital goods imports and domestic capital formation and the previous year's export earnings, but the connection is much less clear for the other sample countries. For Chile, indeed, fluctuations in export value may be irrelevant to variations in domestic income; what matters is rather the "value returned" by the expatriate copper companies to the Chilean economy.

Useful though these country studies are, they do not constitute a systematic analysis of the problem at hand. A major limitation, in the case of the less-developed countries in the sample, is the lack of reliable, relevant and comparable statistical series. This introduces a note of uncertainty at many places in the argument. For such countries, a definitive analysis of the effects of fluctuations in exports will have to await improvements in basic statistical data. For other developing countries, the most promising approach would probably be to start with a computable model of the working of the economy, and then to simulate the effects of introducing a series of random shocks (or a pattern of shocks based on past experience) in the export sector. Though MacBean's work cannot be regarded as definitive— indeed, at several crucial points his generalizations do not appear valid— it has exposed an important problem in applied economics and has laid the basis for a more systematic approach in the future.

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*International Development 1966.* Edited by H. W. SINGER, NICHOLAS DE KUN AND ABBAS ORDOOBADI. Dobbs Ferry: Oceana Publications, 1967. Pp. vii, 341. $10.00.

The Society for International Development is, according to its own characterization, an assemblage of persons mainly engaged in or associated with programs of international development. Its main purpose is to stimulate the ex-

change of ideas, facts, and experience in its special field of interest. Like most such societies, it holds annual meetings with speeches, panel discussions, and papers devoted to some of the currently prominent or controversial topics of development.

With its sixth such meeting in 1964, the Society apparently decided that the substance of these sessions was worth preserving and compiled a volume of proceedings.[1] This was followed by a sequel in 1965[2] and the latest volume which is here under review. The size of these volumes has more than doubled between the 1964 and 1966 compendia which causes one to wonder about the future growth curve. As with most cases of overrapid growth, however, there has been some obvious misallocation of resources resulting from an overly protective editorial policy. Presumably if healthy growth is to occur in the future, there will be some shaking out of the weaker parts of the system.

Altogether there are 54 papers in the latest volume. Some of the main topics dealt with are: how to change agricultural technology; the relations between industrialization and agricultural development; trade patterns and the role of import substitution; changing aid patterns and the nature of absorptive capacity; institutional reports on the regional development banks; and a discussion of the so-called "brain drain." By and large these selections represent an effort to transmit some of the recent thinking—especially of the academicians—to the practitioners, and some of the lessons of experience of the "old hands" to the new recruits. There is also an element of the "pep rally" to raise the flagging spirits of those involved in the "development business."

One of the worst features of the volume is that the editors have excluded practically all footnotes or citations of references which makes it exceedingly difficult to ascertain how these individual papers relate to the existing literature or if they are available in greater detail elsewhere. While this is not a problem for some of the more personalized or reportorial papers, it is a serious disadvantage for the more theoretical papers. This editorial policy is most distressing in connection with two of the best papers in the book—one by John H. Power on import substitution and another by Vernon W. Ruttan on industrialization and agricultural development—both of which review and evaluate the literature without ever citing the sources of the writings. Anyone wishing to explore these writings on his own would have to spend much time in retracing the author's steps, unless he could find a more professional version of the same paper in a standard journal.

The Power paper explores the dangers of industrialization strategies biased toward import substitution. Ruttan compares the "stages of growth" theories of development with the "dualistic economy" theories and concludes that while both "focus attention on the critical role of agriculture in the development process," neither offers policy guidance on how to raise agricultural productivity. A related paper by John Mellor argues that the most important factor for raising agricultural productivity is the institutional arrangements

[1] Theodore Geiger and Leo Solomon, ed., *Motivations and Methods in Development and Foreign Aid*. Washington 1964.

[2] Stephan H. Rubock and Leo M. Solomon, ed., *International Development 1965*. Dobbs Ferry 1966.

for supplying those inputs which embody new technology, and that planning for agricultural development should concentrate on the design of such institutions.

Several papers focus on the trade gaps of the developing countries and policies to overcome them. (An interesting omission is any serious concern over the domestic savings gap.) Raul Prebisch presents his oft-expressed arguments for a reorganization of world trade policies and Lal Jayawordene, a member of the UNCTAD staff, makes the case for preferential treatment of manufactured exports from the developing countries.

There is no underlying theme to this volume and the numerous individual pieces defy separate evaluation. Perhaps the most meaningful commentary is in terms of the utility of the overall collection. I doubt that it will find much use as supplementary reading for courses on development because of its uneven coverage and because most of the more comprehensive papers are likely to be presented elsewhere in fuller and more professional form. Similarly, I doubt that anyone other than the editors and a few reviewers will read the book from cover to cover, and I would not suggest that such a reading is rewarding. Perhaps some individuals in remote parts of the world who do not have access to recent journals and texts may gain some insights into recent thinking on the topics covered in the book, but I question whether this justifies the effort that went into its preparation. If such volumes are to be produced in the future, their usefulness would be enhanced by some indication of references especially where a fuller treatment of the given topic may be found.

DAVID C. COLE

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*The Economics of Poverty.* By THOMAS BALOGH. New York: Macmillan, 1966; London: Weidenfeld and Nicholson, 1967. Pp. xvii, 374. $7.95.

The persistent refrain throughout this selection from Balogh's work during the period 1955 to 1966 is that the theory and institutions of the North Atlantic community are not easily transferable to the less developed areas of the world. Reading it, one sees the author as the boy at the dike, trying desperately to stem the tide of ignorance. The analogy is particularly apt when Balogh's references to the literature of development are directed to such authors as Schultz and Tinbergen.

Originally published in professional journals or circulated as memoranda, conference papers, and reports, most of the 20 articles in the volume deal with particular problems of development in Asia, sub-Saharan Africa, Latin America, and the Mediterranean. However, several short pieces discuss the relevance of the market to developing economies, and several others are devoted to the role of agriculture, education, and trade.

Repeatedly, Balogh points out that the extreme heterogeneity of most underdeveloped territories makes them poor hosts to policies built upon the assumption of homogeneity and linearity. The labor forces, managerial elites, and pervasive cultures of the advanced nations, even in their early stages of development, were far more homogeneous than Africa, Asia, or Latin America

today, or even tomorrow. Commenting on the Tinbergen model for education, given at an OECD Conference in 1962, he says. "A bit of common sense in asking the relevant questions before one sets out to build up a model, and a knowledge of the particular historical or sociological factors, surely is necessary" (p. 88).

For example, increasing the input of conventional literary education probably deters growth. As the West African experience has shown, this produces school-leavers who are alienated from the only sector capable of absorbing them, agriculture. Thus alienated and lacking marketable skills, they flock to the cities to swell the tide of unemployment and to create a potentially explosive, detribalized proletariat. Just because the United States data show a good statistical fit between economic growth and the investment in human capital, one cannot assume that the policy is transferable, for instance, to Nigeria. And it is not only a question of what kind of education. In an economy which lacks a demand for skilled labor, learning to run a wood lathe in a technical school is no greater advantage than learning Shakespeare.

Balogh attributes the breach between "development economics" and the received doctrines of the more traditional vein to a failure to recognize the nature of the assumptions that the two groups utilize. The more involved the development economist becomes with the problems of particular countries, the greater his concern with heterogeneity, while in advanced economies, the production functions are becoming increasingly linear and homogeneous. The breach will widen, he suggests, just as the differential in income widens between the two types of economies. Again using education as the example, the supply of school teachers in the United States might readily be increased through a subsidy to teacher education or a tax benefit to teachers. But in Africa, such a policy might not work because the education that would enable an individual to teach might also open government or commercial opportunities to him. The failure to place economic theory and policy within the framework of a particular country's social and political practices is not unique to any one area or one group. Balogh discusses the problem in relation to India (p. 367), Nigeria (p. 90), and Jamaica (p. 316).

The British and American failure to develop new theories and policy to aid the less developed nations in escaping from poverty is discussed in a brief introduction written in 1964, before Balogh became a member of the Labor Government Establishment. He expresses discouragement that this inadequacy should continue to push the underdeveloped nations "to other sources of knowledge and inspiration." "The non-Communist world," he wrote in 1958, "must realize the terrible urgency of rapid development away from peasant production and towards the establishment of modern industry and agriculture, if convulsions, and a possible catastrophe, are to be avoided" (p. 55).

The large number of spasms in the world today suggest that we have not realized that urgency, or perhaps have simply not met its challenge, and Balogh's criticisms of economic theory and policy go a long way toward explaining why!

JOHN P. HENDERSON

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*Latin America: Problems and Perspectives of Economic Development, 1963-1964.* By the Department of Economic Affairs, Pan American Union. Baltimore: The Johns Hopkins Press, 1966. Pp. 242. $6.50.

This book contains an effort on the part of the Pan American Union to assume the reporting function which for many years has been performed by the United Nations' Economic Commission for Latin America in its annual *Economic Survey of Latin America.* As in the case with the ECLA series, the book's purpose is to identify the constraints on development in each country and the region generally, and to report on progress (or lack thereof) in coping with the various internal and external difficulties confronted during the period considered. In addition, in the volume under review a special effort is made to formulate an appraisal of the Alliance for Progress since its inception through 1964.

There are four rather longish chapters. The first, entitled "Current Status and Immediate Outlook for Latin American Development," contains a review of estimated growth rates and perceived development constraints by country for the period 1960-1964, with projections for 1965-1966. External resource availability is identified as the principal constraint operating throughout the region, and a detailed analysis is presented of foreign exchange receipts on both current and capital account and on both a gross and net basis. The second chapter, entitled "Export Problems, Prospects, and Efforts Toward Regional Integration," is devoted primarily to discussion of problems in the markets for traditional commodity exports and of efforts to achieve greater export diversification. The third and fourth chapters are entitled, respectively, "Problems of External Financing" and "Problems of Domestic Efforts," and together constitute the main substance of the book. Throughout the text is interspersed a large amount of statistical information, there being 69 tables in all.

In Chapter 3, after a detailed review of the inflow of official external funds (by source, and in terms of both new commitments and actual disbursements), it is concluded that the problem confronting Latin America "is not so much one of shortage of aid in general as one of specified type" (p. 157).

> Savings which the private sector . . . [of the developed world] . . . is willing to invest . . . directly, or which official agencies can capture through taxation or loans for the purpose of relending to . . . Latin America, are more than sufficient to attend to all development projects, *provided* [emphasis added] they meet all the following requirements: they must yield a return comparable to ventures involving similar risks at home, they must be amortizable over relatively short periods and must not present any . . . exchange risks. . . . A grave problem exists with regard to financing projects and programs which do not meet one or more of the specifications. . . . Giving more help at considerably more flexible terms than presently granted to finance programs and projects which do not yield direct returns is essential to assure the success of the Alliance (p. 157).

The case for softer terms on official loans is, of course, buttressed by reference to the external debt problem of Latin America. But, interestingly enough, the authors go beyond calling for greater magnanimity on the part of official

foreign-lending institutions—by urging Latin American governments to make greater efforts to avail themselves of the potentially larger inflow of private investment from abroad. After noting that "the confidence of foreign investors arises . . . from the attitudes of the governments toward foreign capital" and that "when this attitude is properly expressed in an articulate, coherent policy that can be expected to persist in the future, foreign capital finds the framework it requires to plan and develop its activities systematically" (pp. 169-70), the book goes on to suggest "a number of measures . . . for promoting a favorable climate for foreign investment in Latin America, particularly in the manufacturing sector" (p. 173). The suggestions include: establishment of industrialization priorities which make sense to potential investors in the context of a country's overall development program; reasonable provision for remittance of profits; and, more generally, greater emphasis on promotion of foreign investment by individual countries and the region as a whole.

With respect to the "domestic efforts" required on the part of the Latin American countries, the usual analyses are offered—namely, that public sector savings must be increased by tax reforms and other measures; that public administration must be improved for more effective development planning and financial control; and, that additional emphasis must be given to achievement of greater agricultural productivity, especially by means of land tenure reform.

While a commendable effort has obviously been made to construct a balanced appraisal of the available evidence, the book is somehow less readable as a consequence. For those who (like myself) prefer to be challenged by the often-loaded ECLA presentations it is indeed fortunate that publication of the *Economic Survey* is not (as was once planned) to be terminated in favor of future Pan American Union volumes in this series.

DWIGHT S. BROTHERS

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*A Village Economy—Land and People of Huecorio.* By MICHAEL BELSHAW. New York and London: Columbia University Press, 1967. Pp. xxiv, 421. $10.00.

After spending over two decades in a frustrated search for simple solutions to the problem of economic development, the profession is returning to first principles. There is growing recognition of a need for broad and detailed historical and institutional material on specific economic systems as preconditions for the construction of diagnostic and prescriptive models of resource allocation, income determination, and growth. As with the classificatory schemes based on myriad observations which biologists employ to determine what has *not* as well as what has happened in a specific ecological setting, economic taxonomies must be built up from painstakingly collected factual detail to be able to reveal what ought to be occurring in a given economic environment. Otherwise the economic models will be powerless to isolate essential elements of growth which are missing in a particular system much less explain their absence. The development economist on recognizing the need for a maximum of factual detail and the interplay of social, political, and even psychological fac-

tors in economic behavior is rapidly becoming a human ecologist especially as
he begins to analyze peasant communities.

Small wonder that the mainstream of development economics has until now
avoided peasant communities, leaving this fascinating terrain to the economic
anthroplogist and sociologist. In this vein it is good to discover a book such
as Belshaw's which it is hoped will set a trend. The fact that the author is in
a new area for economists *per se* helps to explain (and perhaps excuse) the
analytical weaknesses of the present volume. Though explorers often get lost
and occasionally die in the wilderness, they point the way ahead. Although
Belshaw appears at times to have wandered without map or compass, the
pages of his travel record are filled with fascinating detail that will provide
indispensable reference points for future social scientists.

The region selected for study is a small village on the shore of Lake
Pátzcuaro in the Tarascan highlands of the state of Michoacán in Mexico.
Apart from several independent visits by the author, the majority of research
was conducted during the summer of 1962 by a team of his students using
questionnaires which he had prepared earlier. Meso-American peasant commu-
nities and particularly those in the south-central region of Mexico have been
subjected to frequent and penetrating analysis by anthropologists giving rise
to works by, among others, Robert Redfield, George M. Foster, Ralph L.
Beals, and Oscar Lewis. As early as 1952 Howard Cline cites 24 major studies
of modern Mexican communities including three in the state of Michoacán
alone.[1] Although Belshaw makes occasional references to factual material from
other community studies in Mexico, he seems to have written largely outside
of the context of the rich anthropological literature on the subject.

Admittedly, despite its high quality, little of the anthropological research
(with the possible exception of the works of Sol Tax and George M. Foster)
provides much material on those aspects of activity relevant to the problems
of development, including the economic implications of acculturation or its
lack. Since the author deals specifically with these questions it is unfortunate
that he does not publish the questionnaires or interview designs used in his
research. Nor does he provide a theoretical framework for the study except to
organize the chapters in the form of a production function following the pat-
tern of traditional economic development texts dealing with land, agricultural
technology, labor, capital, and entrepreneurship in succession. Problems of the
political and social structure of Huecorio, characteristics and rates of growth
of its population, living levels, and rural welfare policies are considered in de-
tail though largely in isolation with little or no attempt to integrate the anal-
ysis.

The selection of Huecorio among the thousands of villages of Mexico was
by no means random, since the author admits "The community would have to
be open and not hostile to outsiders who would not have time for the usual
'softening up' and familiarization; and it would have to accept the intrusion
of a group of people rather than the quiet insinuation of one person working
by himself. Huecorio proved a happy choice" (p. xiv). Because the town is

[1] Howard Cline, "Review Article: Mexican Community Studies," *Hispanic Am. Hist.
Rev.*, 1952, *32*, 212-42.

adjacent to a tourist center (Pátzcuaro), close to a trunk highway which is a major route of migrant farm workers moving north and west, is located on a rail line, was an important center of civilization before the Conquest, is near a UNESCO-sponsored center for rural education (CREFAL), and has received technical assistance from the FAO, the federal government, and Montana State College and has received indirect benefits from a major river basin development project (Tepalcatepec) immediately to the south, it cannot be called a typical Mexican community. Huecorio is high, cold, and somewhat inhospitable climatically and, although its population has doubled in the past 30 years (below the national rate), the agricultural labor force has risen only 28 per cent since 1922. Productivity per hectare has apparently declined, except where fertilizers have been applied, while the amount of land in use has risen slightly. Yet because it is located in a backward region of one of the most rapidly developing Latin American countries with its people engaged in a continuing compromise between subsistence and commercial cultivation of small plots of land, Huecorio is ideally situated for a study of economic ecology.

Nevertheless the best sections of the book deal with the facts of rural technology at the subsistence level, the importance of the steel plow (and advantages of imported over domestically produced plows), the relative receptivity to new techniques, frustrations of rural extension workers, attitudes of individual farmers to change (described in detail), and comments of those who, after leaving the village as *braceros,* chose to return. The author's documentation of farmers' preferences for income security as a reason for planting less productive subsistence crops (maize and beans) rather than cash crops is convincing and makes an important contribution to the literature on agricultural development. His appraisal of the minifundia system produced by the agrarian reform is complicated by confusions between productivity and employment considerations. In view of low yields in both subsistence and commercial agriculture in Huecorio plus large net emigration from the village and movement of the local labor force into other more productive activities, his arguments for maximization of the man-land ratio through the maintenance of small holdings are unconvincing. Indeed his views of the possibilities of agriculture in Huecorio are almost fatalistic.

The study indicates that despite 20 or more years since agrarian reform and repeated contacts with forces of modernization (improved communications, roads, electricity, rural extension, hybrids, increasing urban demand for cash crops of the region, and education) present living levels in the community are still extremely low. Although this is attributed to a limited amount of land which is itself of low quality plus population pressure and the lack of public investment in the development of the *municipio* itself, the study suffers from a lack of historical perspective or a sufficiently ecological approach.[2] Perhaps the solution to the problem of Huecorio is emigration rather than expenditures on infrastructure, technical assistance, and subsidized loans. One can-

[2] An interesting but controversial presentation of an ecological approach to community development is offered by Richard N. Adams, "The Community in Latin America: A Changing Myth," *Centennial Rev. Arts and Sci.,* 1962, *6,* 409-34.

not blame the author for the failure of the profession to provide an analytical framework in which to integrate the important and interesting descriptive detail of his study. One would have hoped, however, that he might have traced a rough map for future scholars. Nevertheless he has provided a wealth of source material which cannot be ignored by any student of rural development. The author and publisher must be commended on a well-written and impressively bound volume which has enriched the literature.

CLARK W. REYNOLDS

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### Statistical Methods; Econometrics; Social Accounting

*Essays in Mathematical Economics—in Honor of Oskar Morgenstern.* Edited by MARTIN SHUBIK. Princeton: Princeton University Press, 1967. Pp. xx, 475. $12.50.

First of all, it should be pointed out that, in spite of the title of this collection, not all the essays are in "mathematical economics" even in the broadest sense. Whitin's discussion of the irrelevance to actual management decisions of the economist's obsession with the determination of optimum factor proportions ("The Role of Economics in Management Science") is not, nor are the papers by Koo on comparative advantage ("Competition of American and Japanese Textiles in the World Market") or Marcus ("Moderating Economic Fluctuations in the Underdeveloped Areas"). It would be a pity if these contributions were buried simply because those who may be most interested in them would hesitate to open covers bearing the word "mathematical," while those primarily interested in mathematical economics passed them by. The remaining essays in the volume do fit the title if we interpret it quite broadly, but the true nature of the collection is, of course, described by the subtitle, "In Honor of Oskar Morgenstern."

Morgenstern's place as one of the immortals of economics is derived from his collaboration with von Neumann. In spite of his many publications, his next most important contribution to economics has been through his interest in, and encouragement of, the work of others. This collection is representative of the people and the topics that bear the mark of this encouragement.

As is fitting, the first and largest group of contributions is in game theory. They represent very well the current relationship of game theory to economics. The theory of games did not have the impact on economics that Morgenstern originally anticipated. It was the first major influence in the moulding of the "new" mathematical economics. However, its younger spiritual cousins, linear programming, activity analysis, and generalized optimizing theory which, like game theory itself, broke with the smooth regular world of neoclassical mathematical economics, proved more directly applicable to a wider range of problems in economic analysis than the theory of games did. Game theory was, and remains, the obviously appropriate tool for the analysis of imperfectly competitive equilibrium. Even now, this analysis has not been completed, but progress is steady (if slow). The first six contributions to the

volume are concerned either with the problem of imperfect competition or with the development of game theory itself in the direction required (multi-person games) for analysis of the problem.

A useful discussion of the general approach to the problem is given by Shapley and Shubik ("Concepts and Theories of Pure Competition"), although one suspects this essay was one of the earliest written for the collection. A particularly good paper in this group is Aumann's ("A Survey of Cooperative Games Without Side Payments"), and this carries the most up-to-date bibliography. The essays by Kuhn ("On Games of Fair Division"), Davis and Maschler ("Existence of Stable Payoff Configurations for Cooperative Games"), Peleg ("Existence Theorem for the Bargaining Set $M_1^{(1)}$") and Shapley ("On Solutions that Exclude One or More Players") are more technical and more limited.

Related in spirit to game theory are two contributions which have been fitted into other groupings, one by Stern on oligopoly ("Some Notes on Oligopoly Theory and Experiments", grouped with the Whitin essay already mentioned under "Management Science"), and the other by Mayberry ("Alternate Prior Distributions in Statistical Decision Theory").

It is interesting to turn from the first grouping in the volume to the last. These five essays under the heading of "Econometrics," comprise two on index number problems and three on spectral analysis. Although the Princeton work on spectral analysis of economic time series represents one of the most recent projects to receive Morgenstern's support, his interest in time series goes very far back. His first published work was in business cycles (1927), and some of Wald's early work on time series analysis was to solve problems brought to the fore by Morgenstern. Incidentally, since we have harked back to Morgenstern's Vienna period, a valuable contribution to the volume is the English version of Menger's paper on the St. Petersburg paradox ("The Role of Uncertainty in Economics") which was originally circulated in the 1920s and published (in German) in 1934.

Of the spectral analysis papers, those by Granger ("New Techniques for Analyzing Economic Time Series and Their Place in Econometrics") and by Hatanaka and Suzuki ("A Theory of the Pseudospectrum and Its Application to Nonstationary Dynamic Economic Models") are theoretical, while that by Godfrey and Karreman ("A Spectrum Analysis of Seasonal Adjustment") compares the application of several methods to artificially generated time series containing a seasonal. In the two index number papers included in the same grouping, Afriat ("The Cost of Living Index") is searching for a cost of living index satisfying consistency tests. Mizutani ("New Formulas for Making Price and Quantity Index Numbers") for an "ideal" index in the manner of Irving Fisher.

The remaining essays are widely dispersed in topics and rather loosely collected under various headings, which should not be taken too seriously. Borch's essay ("The Economics of Uncertainty") is more decision theory than economic theory, and Orr's ("Capital Flexibility and Long Run Cost Under Stationary Uncertainty") as much economic theory as decision theory. Noble turns input-ouput into output-input ("A Property and Use of Output Coeffi-

cients of a Leontief Model"), Thompson discusses a problem in discrete programming ("Some Approaches to the Solution of Large-Scale Combinatorial Problems"), and Tornqust gives another variation of the formal equivalence of minimaxing and optimal programming ("Minimaxing and Optimal Programming"). There is an application of Bayesian methods (Miyasawa, "A Bayesian Approach to Team Decision Problems") and a discussion of subjective probability (Pfanzel, "Subjective Probability Derived from the Morgenstern-von Neumann Utility Concept"), a note on a kind of utility by learning (Peston, "Changing Utility Functions"), one of Baumol's minor pieces ("The Ricardo Effect in the Point Input-Output Case"), and a requisition-smoothing algorithm by Harlan Mills ("Smoothing in Inventory Processes").

Is there significance in the fact that one of Morgenstern's special interests is notably unrepresented, namely the line of thought of his *On the Accuracy of Economic Observations?* Perhaps this subject is too uncomfortable.

Any collection of essays from a variety of authors suffers certain disadvantages. A conference volume has, at least, unity of subject, while *Festschrift* has not even this. Thus the potential reader of a volume such as the present one has little guidance as to whether its contents will interest him. A desire to honor a great teacher or colleague does not always run to a willingness to publish one's latest, or more important, work in the volume. As *Festschriften* go, this one is good enough.

KELVIN LANCASTER

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*Matrix Methods in Economics.* By CLOPPER ALMON, JR. Reading, Mass.: Addison-Wesley, 1967. Pp. 164. $6.95.

Professor Almon wrote this book because he felt there was a gap between standard introductions to mathematics and statistics, and the conventional texts on econometrics and mathematical economics. There was, in brief, no unified treatment of "matrix inversion, multiple regression, the analyis of variance and covariance, Lagrangian multipliers, linear and nonlinear programming, and the characteristic values of matrices." He points out that a quantitative economist must have a thorough understanding of these topics before proceeding to the advanced techniques regularly employed by econometricians. In addition, he feels that a quantitative economist should be familiar with a machine language, and his choice for this is FORTRAN. All of the topics mentioned are covered by Almon in this short and tightly written book. While most sections make use of matrices in one way or another this is certainly not a conventional introduction to matrix algebra.

The formal treatment of matrix algebra is limited to the pages of Chapter 1, and a tremendous amount of information is compressed into this limited space. The method of matrix inversion which Almon favors is that of Gauss-Jordan elimination with its pivot operation. In the second chapter the pivotal process is used for least-squares computations, and with a slight addition it becomes the basis of the simplex method of linear programming in Chapter 4. In between, in Chapter 3, Almon presents what is undoubtedly the most compact treatment of FORTRAN programming to appear in print. The remaining

three chapters deal primarily with nonlinear maximization, and the computation of the characteristic values of symmetric and nonsymmetric matrices.

The formal prerequisites for using this book are a good knowledge of calculus, including differential equations, and a working knowledge of elementary statistics. But another prerequisite not mentioned by the author is what teachers of mathematics call "mathematical maturity." This is a rigorous book, and while there is an emphasis on computation, particularly in the early chapters, the author has made few concessions to pedagogy. All of the theorems used are proved, and illustrative examples are held to a minimum.

In the conventional introduction to matrix algebra the student is taught the concept of a determinant, and determinants are used to invert a matrix. But Almon shares the impatience of some pure mathematicians with this approach; he relegates his short discussion of determinants to an appendix. He feels that ". . . determinants are of no computational—or, as far as I can see, theoretical—value. . . ." Although the theory of matrices grew out of the theory of determinants, the *idea* of a matrix logically comes first. As Macduffee pointed out in his Carus monograph "the relation of determinant to matrix is that of the absolute value of a complex number to the complex number itself, and it is no more possible to define determinant without the previous concept of matrix or its equivalent than it is to have the feline grin without the Cheshire cat."[1] As a nonmathematician I would not have the temerity to dispute such high authority. But in teaching the rudiments of matrix algebra to students of economics the determinant is still a useful pedagogical device. One has to point out, of course, that efficient computer programs do not use determinants—they use the pivotal process described by Almon—but it is easier to grasp advanced computational techniques once the essential notion of a general solution of a system of linear equations has been described in simpler terms.

In his treatment of linear programming Almon eschews the traditional set-theoretic introduction, and moves directly to the simplex method. Even the relatively simple transportation model is handled within this framework. There are no frills, but all of the essentials are covered including duality and shadow prices as well as the problem of degeneracy. An interesting feature of the book is a short but lucid discussion of orthogonal regression. There appears to be a growing interest among economists in the use of factor or principal component analysis, and Almon has provided a brief introduction to the theory behind this method.

Almon clearly did not have a mass market in mind when he wrote this book. Readers looking for a "mathematics made easy" approach will not find it here. But this is not to detract in any way from the author's style. His erudition shows throughout the book, and his prose while tight is unambiguous. There can be no doubt that this book will serve a useful function. The student who masters it will be more than adequately prepared for graduate courses in econometrics and mathematical economics.

<div style="text-align: right">WILLIAM H. MIERNYK</div>

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[1] Cyrus Colton Macduffee, *Vectors and Matrices*, The Mathematical Association of America, Ithaca, N.Y., 1943, p. v.

## Economic Systems; Planning and Reform; Cooperation

*Papers on Capitalism, Development and Planning.* By MAURICE DOBB. New York: International Publishers, 1967. Pp. 274. $5.95.

The book under review is composed of a series of essays, some published for the first time. The compilation is in six parts: Part 1 is devoted to some problems of the history of capitalism. Part 2 reviews some aspects of economic development. Part 3 consists of reflections on the theory of investment planning and economic growth. Part 4 is on the question of investment priority for heavy industry. Part 5, by far the largest, covers planning and the Soviet economy. Part 6 is an introduction to the Italian edition of *Capital.* This is quite a menu and even by concentrating on only a few selected essays the reviewer cannot do full justice to Mr. Dobb's writings. Reading this book is an intellectual delight. Few economists have the command of both modern economic theory and Marxian economics possessed by Dobb. Nor are there many who have the ability to clearly express complex propositions in such precise and exquisite language. One may quarrel with Dobb's views and preferences for institutional arrangements (among others, I have argued elsewhere some of the points raised in this book and have presented them in a different light) but *audire alteram partem* Dobb's writings should be consulted without fail for a superb rationalization of some aspects of the Soviet mode of economic development.

The Soviet industrialization strategy adopted an "unorthodox development sequence" by concentrating on the preferential growth and lead of the capital goods industries. It emerged as the antipode of the "orthodox sequence." In the great discussion that preceded the launching of Soviet forced industrialization, the exponents of the "orthodox sequence" argued that the first stage of development should involve the expansion of agriculture and the agricultural processing industries. Although such a development pattern might be achieved at the cost of temporary deceleration of the industrial growth rate, it is at the later stages that heavy industry should be developed. The argument in favor of developing agriculture first in the Soviet economic conditions of the 1920s stems from the reasoning that agricultural exports are the cheapest possible means of securing ultimately a higher rate of growth than could be achieved with immediate maximum forced diversion of capital to industry. Investment of capital in agriculture is generally more profitable than in industry because the capital-output ratio is considerably lower in the former and the production flow would be forthcoming from it much sooner. Whereas during the period of reconstruction of capacity only small expenditures are required to maintain the capacity intact or to slightly increase it, the returns are high and quick everywhere. But when substantial additions to existing capacity are made, or reconditioning of obsolete plants undertaken, such investments in heavy industry require larger diversions of resources and longer periods of gestation than in light industry. At the other extreme of the spectrum of opinions canvassed, the primacy of developing heavy industry and financing industrial growth predominantly by pumping-over the means from the private sector

through nonequivalent exchange was advocated for a variety of economic, political, and strategic reasons (pp. 126-39).[1]

Dobb explains clearly the rationale behind the investment priority for heavy industry argument. He shows under what conditions it is valid for achieving a high growth rate. His treatment should be particularly noteworthy in view of the disrepute into which this "law" of industrialization has fallen in both the East and the West. "The proposition that, *ceteris paribus*, the future potential growth-rate of output will be higher the larger is the proportion of current investment devoted to enlarging the productive capacity of capital-goods industries, has always seemed" to Dobb "sufficiently obvious, once stated, to admit of little if any dispute" (pp. 110-11).

Admittedly, assuming a completely free trade with high demand elasticities, it would not matter much whether a country pursued a development path by concentrating on the output of structural steel and machinery or by indirect production. But such a situation did not prevail in the Soviet Union during the period of accelerated industrialization and in most developing countries today export capacity is limited by low demand elasticities. Also, *inter alia,* if real wages cannot be reduced further for social, efficiency, or incentive reasons, it may prove impossible to expand employment and output in capital goods industries at a rate faster than that of consumer goods (assuming full capacity, absence of technical change of a sufficiently potent labor-saving variety, and no opportunity to lower significantly the capital-output ratio). Moreover, "as the capital-goods sector grows in size, the proportion of annual net investment directed towards it will need to be progressively increased in order to boost the growth-rate further" (p. 114). Eventually the preferential treatment of this sector will be moderated.

Dobb presents two main alternatives: In the first variant the pattern of investment allocation between sectors is stabilized at the existing level. In such a case the capital goods sector will continue to grow for a while at a higher, but decelerating, rate than that of total output and consumer goods. Since the growth rate of the consumer goods sector will be accelerating eventually, an equiproportional expansion of capacity in capital goods and consumer goods sectors will emerge. Alternatively the second variant postulates that, in order to raise consumption, the priority in allocating investments may be accorded to the consumer-oriented sector (at the expense of heavy industry). But then the rate of growth of total output will decline.

Dobb argues that since the mid-1950s or so, the Soviet Union has experienced a transitional period characterized by the first variant, exhibiting a much closer approximation of rates of growth of producer and consumer goods sectors and displaying in the latter part a tendency of reduced tempo of growth. It is noteworthy that, in principle, investment priority is still accorded

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[1] For a fuller analysis of the background and issues involved in the great debate see Alexander Erlich, *The Soviet Industrialization Debate, 1924-1928* (Cambridge, Mass., 1960). For arguments for the "unorthodox sequence" see E. Preobrazhensky, *New Economics,* translated from the Russian by Brian Pierce (New York, 1965) and for a translation of some contributions to the discussion see Nicholas Spulber, ed., *Foundations of Soviet Strategy for Economic Growth* (Bloomington, Ind., 1964).

to heavy industry. There are indications of an emerging trend favoring the second variant. But Dobb considers it unlikely that the second variant will endure since a drastic rise in consumption would be purchased at the cost of a reduction of the overall growth rate, unless counteracted by a technical advance. Probably over the next two decades, ruling out war, something akin to the first variant will be pursued (pp. 115-16). Parenthetically, I would stress that a rapid rise in consumption standards might drastically contribute to improvement of the system's efficiency through its effect on productivity—as Soviet research seems to bear out.[2] A significant additional source of growth could be released by raising economic efficiency.

Dobb calls attention to the changing scene in the Soviet Union and some East European economies where labor reserves have been exhausted and where there are alarming signs of labor shortages. Whereas previously growth of industrial output was largely achieved by extensive methods, now industrial output must increasingly be expanded by improving productivity—which was indeed the propeller of modern economic growth in the West—achieved mainly by capital deepening. But technical innovations could be of a capital-saving and labor-saving variety. As productivity might be increased without concomitant increases in capital outlays, a case for the preferential growth of the capital goods industry cannot rest on a prediction of a likely trend in the capital-output ratio (p. 121).

On reading Dobb's illuminating discourse one is faced once again with the question: How would the Soviet economy have developed had other alternatives, presented during the industrialization debate and later discarded, been adopted? But, given the chosen path of development, there is much to be said for Dobb's view that, when the paramount objective was super-rapid industrialization, the planning problem was essentially one of keeping "the circular production-flow moving smoothly without interruption" and under such conditions the principles of Pareto's optimum were irrelevant (p. 194). There are certain logical consequences of adopting such a planning system. Among them, the role of producers' prices is then not as irrational as it seems to the Western observer. Dobb sees the fundamental weakness of the Soviet price system as that of encouraging the squandering of capital. In the past Marxists had paid little heed to microeconomic processes of adjustment. Dobb devotes much space to a discussion of optimal planning and prices. He considers that insufficient attention is being paid by the debaters to modifying production conditions and to the distinction between the "normal" price and the "short-term" price (equilibrating current demand and current available supply). For purposes of effective economic calculation not only "short-term" prices are relevant, but "once the problem is widened to include the alteration and adaptation of supplies themselves as inputs, one cannot proceed further without some standard 'normal' price with which the current short-period market price can be *compared*" (p. 200). Dobb argues that in a planned economy adjustments are made by varying the production-flow. Price flexibility is "necessary only in the case of particularly stubborn supply-inelasticity" (p. 202). For invest-

[2] *Cf.* A. L. Vainshtein, *Ekonomika i matematicheskie metody,* No. 1, 1967, pp. 25-28.

ment decisions, future valuations rather than current scarcity relations are relevant. Generally, in Dobb's opinion, the crucial issue is to "get macro-price-relations approximately 'right,' and that if this be done micro-price-relations can mostly be left to look after themselves" (p. 241).

Had greater weight been given to the market in the process of development, I would be inclined to think that some of the dislocations, low productivity, and inefficiencies might have been averted. But whether market socialism would have produced better or worse results (in terms of the regime's leaders' objectives) and what would be the optimum combination of command and market-type instruments during the various stages of development are thorny issues. This brings to mind the present alterations in working arrangements taking place in the Soviet Union and Eastern Europe and the close interrelationship between the growth strategy and the functioning of the system.

On the occasion of Mr. Dobb's retirement from active teaching duties at the University of Cambridge and Trinity College, the reviewer would like to pay homage to this great scholar and true gentleman and wish him many more years of productive work.

GEORGE R. FEIWEL

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*Marx's Economic Predictions.* By FRED M. GOTTHEIL. Evanston: Northwestern University Press, 1966. Pp. xv, 216. $7.50.
*Soviet Economic Controversies—The Emerging Marketing Concept and Changes in Planning, 1960-1965,* By JERE L. FELKER. Cambridge, Mass. and London: Massachusetts Institute of Technology Press, 1966. Pp. x, 172. $5.95.

These two books, although disparate, lend themselves to review under a common rubric. Fred M. Gottheil's *Marx's Economic Predictions,* among its other weaknesses, is inexcusably obsolete, while the great strength of Jere L. Felker's *Soviet Economic Controversies* is its timeliness.

The task which Gottheil set before himself will strike many economists as being a strange exercise in scholasticism: "This present study attempts to evaluate the Marxian economic predictions. The object here is not to pronounce judgment on the accuracy of the predictions in the historical sense but rather to determine the bases upon which the predictions were made and then to evaluate the predictions as derivatives from the assumed bases" (p. 4). Any attempt to test "the reality of the theoretical structure" is "not the purpose of this book."

The first section, approximately half of the book, is devoted to a pedestrian formalization of Marx's economic model. The second, and even less adequate, half of the book attempts to determine if Marx's economic predictions follow from his economic model. The impression that Gottheil is ignorant of the existing literature concerning Marx's analysis is reinforced by his bibliography of works by authors other than Marx and Engels. It is composed of six entries, four books, and two journal articles.

The result of this neglect of previous studies is that Gottheil offers nothing new, and what he does offer has been presented better elsewhere. His attempt

to show the relationship between the economic model and Marx's predictions concerning the falling rate of profit and the absolute impoverishment of the working class is much inferior to that developed by Paul M. Sweezy in *The Theory of Capitalist Development*. His presentation of the international implications of Marx's model is pale compared to that developed by Rosa Luxemburg in her *The Accumulation of Capital*. Gottheil's presentation of Marx's "time of turnover" of capital encompasses approximately four pages (pp. 77-78, 106-10) and includes three formulas, eight symbols, and two numerical tables. A superior presentation appears in a single paragraph in the second chapter of Joan Robinson's *An Essay on Marxian Economics*. A continuation of this list would be depressingly easy.

In Part II of the book, Gottheil follows each chapter with a listing of Marx's "predictions." This exercise in taxonomy classifies predictions as "primary," "secondary predictions related to primary," and "specific." The last category might better be called anecdotal, referring to "definite dates, names or events" (p. 115). Thus, at the end of the chapter entitled "The Proletarian Revolution," we find 55 predictions. The first is the "primary" prediction that "The proletarian class cannot rise without upsetting all existing relations of production," and the last is that "The English Established Church will more readily pardon an attack on 38 of its 39 Articles than on 1/39 of its income" (pp. 187-90).

Although this reviewer is not among them, some economists might find a complete compendium of Marx's predictions useful. However, even these economists would be disappointed. Gottheil's source material is not only limited to that part of Marx's writing which is available in English, but not even all these sources are fully utilized.

*Soviet Economic Controversies* is a refreshing contrast. Felker draws upon both Soviet and Western literature concerning economic developments in the U.S.S.R. during the past decade. His presentation of current Soviet economic debates, a virtual day-by-day account, deserves to be widely read.

Felker's central concern is fortunately broader than indicated by his statement that "(T)his study is an inquiry into the reasons behind the recent shift in emphasis toward the consumer . . ." (p. 6). "Emphasis toward the consumer" was probably not a major impetus behind the recent Soviet economic reforms. The impetus can better be found in macro-economic developments, most notably a decline in the rate of economic growth and a marked increase in the capital-output ratio. For reasons that can better be pursued elsewhere, the Soviet economy somehow outgrew the Stalinist system of physical and direct planning. The antithesis posed in Peter Wiles's stimulating article "Growth versus Choice" (1957), if it ever existed, seems to have been transformed in good Marxist fashion into a synthesis. It appears that the recent reforms adopted to promote economic growth also involve a greater degree of market orientation and consumer choice.

These changes, which emphasize the maximization of profit per unit of invested capital, are generally known in the West. Their partial adoption has led some American journalists and Chairman Mao to maintain that the Soviet Union has "taken the capitalist road." Less known, and most admirably cov-

ered in Felker's study, is that these reforms had to vie with a different set of proposed measures that involved the "normative value of processing." Proponents of this N.V.P. approach also held that the Stalinist "gross value of output" success indicators were inadequate. In broad outline, they proposed that enterprise performance be measured in terms of a series of "normed" costs for value added output. The debate was often acrimonious, with anti-profit dogma on the side of N.V.P. and economic rationality clearly on the side of Liberman and his allies. Felker's account of this debate shows how fortunate it was for the Soviet economy that several fine economists managed to outlive the Stalinist era.

Only when Felker turns to an evaluation of the proper solutions for Soviet economic problems, is his discussion unsatisfactory. With the single exception of a footnote on the "Edsel" debacle (p. 139), he consistently judges Soviet practice against Western theory. Naturally, the former is found lacking. Felker's insistence that the unhampered free market is the *sine qua non* of economic rationality and human well being is simply inadequate. Only what must be described as an economic ethnocentricity can account for his apparent position that the Soviet refusal to adopt "market-oriented" methods such as massive Western-style advertising is due to simply a lack of Marxist "theoretical justification" (pp. 153-55).

Finally, two very irksome mistakes appear throughout the book. First, Felker appears to be unaware of the Marxist distinction between "socialism" and "communism" (pp. 19-20, 24, 30, 130, 152). For the Soviet economist, the U.S.S.R. is still at the stage of "socialism." "Communism," with its rule of "distribution according to need," is yet in the future. Thus Felker meaninglessly upbraids Soviet society for its failure to recognize that it does not follow "communist" principles. Secondly, Felker holds that Stalin "accepted" and "revived" (see pp. 18, 30, 31, 122) Say's Law. While this seriously misrepresents Stalin's position concerning the desirability of supressed inflation, for the much-maligned Jean Baptiste Say it is virtually slanderous.

LEONARD KIRSCH

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*Price Formation in Various Economies.* Proceedings of International Economic Association Conference, 1964. Edited by D. C. HAGUE. New York: St. Martin's Press, 1967. Pp. xviii, 281. $8.50.

The path toward the creation of a genuine and continuing dialogue between Eastern and Western economists has proved to be full of pitfalls. Many continuing exchanges between economists have developed on an informal basis and the present state of economic thought in the two areas suggests that a much more extensive exchange should be quite feasible. Despite the presence of several extremely interesting pieces, the present volume clearly illustrates the barriers to understanding that existed on both sides in 1964, and in large measure continue to exist.

Judging from the contents of this book, the conference does not seem to have been "paying special attention to similarities and differences between

methods of pricing in capitalist and socialist countries," as the dust jacket
avers. The papers themselves are divided into three groups. The first, "pricing
under capitalism," deals with such things as reaction-path analysis of duopoly,
the static analysis of retail trade with spatial discrimination introducing an
element of monopolistic competition, a socio-political framework for the eco-
nomic analysis of the large business, a survey of price regulation in publicly
controlled industries in the United States, and the determinants of inflation in
the United Kingdom. The second, "pricing under socialism," contains three
very brief discussions of some aspects of price formation in Czechoslovakia
and the Soviet Union, and a more or less wage-numéraire analysis of efficient
short- and long-run pricing. The final section contains pieces on the economic
analysis of indicative planning, a two-period, linear-programming, sectoral-
planning model, an analysis of the recoupment period and efficiency pricing,
and a survey of some considerations of pricing for investment choice under
socialism. The authors of the first group of papers are from capitalist coun-
tries, those of the second from East bloc countries, and those of the third of
mixed origin. There is a 50-page summary of the discussions at the (ten-day)
conference, which constitutes a quite detailed and useful review of most of the
papers.

Among the most interesting papers for this reader was J. N. Wolfe's survey,
from the point of view of conventional economic theory, of the possible func-
tions of a planning board which has no power to implement its plans. Among
the points made are that economists are not well prepared to develop the pos-
sibly useful information: for example, the correction of malfunctioning market
adjustment mechanisms by informational activity would seem feasible, but
the theory of adjustment is not yet well enough developed to provide clear
guidelines for work. Also such a board in the service of a government becomes
a pressure group and this may well reduce its primary asset as a toothless
planner, its credibility.

J. Johnston's paper summarizes studies of the determinants of wage and
price level changes in the United Kingdom, showing the general consensus
that changes in excess demand are an important factor. He then points to
the weakness of econometric work based on *ex post* data in dealing with this
problem, since it does not separate out supply factors from demand factors.
Finally, he sketches one possible way of getting at excess demand by hypoth-
esizing an output response function which, above some base level relates in-
creases in demand to increases-in-output response, with the latter increasing at
a diminishing rate. In the discussion the above-mentioned weakness was gen-
erally conceded, but opinions differed as to what might be done about it. Both
Johnston and Wolfe raised issues that are of first importance in the socialist
countries; it is unfortunate that no attempt was made to provide comparable
analyses for some of those countries.

Two papers are quite revealing, in a similar context, of the different styles
of approach to problems that still characterize East and West. J. Lipinski's
discussion of the recoupment period begins with a model in which labor is an
efficient measure of cost and the recoupment period an efficient price, and pro-
ceeds to relax the restrictions. However he always assumes that at least the

ratios of final demands for the various output are fixed. H. Barkai in his lucid discussion of the recoupment period does not feel constrained to begin with a labor value model, places considerable emphasis on general economic interdependence as a hindrance to the use of the recoupment period in efficient pricing, and advocates "far-reaching decentralization" as the appropriate response to interdependence. These two papers stimulated the principal comparative discussion of pricing practices recorded in the summary.

The basic difficulty faced by organizers of a conference such as this is that too many of the Western contributors want to discuss relatively narrow and technical improvements in the received theory while too many of the Easterners want to deal primarily in rather grand and vague generalizations, while communication—and excitement—would probably be maximized if precisely the reverse were done. Surely it would have helped some if each group of authors were of mixed origin; still better would be the assignment of some explicitly comparative papers. The editor and principal organizer of the conference "wishes it were possible to start all over again, not now from the beginning, but from the state of mutual understanding and respect reached at the end of the meeting." It would be most useful if he did try again. In the meantime we are grateful to him and to the sponsors of the conference for generating several papers that economists generally will wish to read.

BENJAMIN WARD

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*Plan and Market under Socialism.* By OTA ŠIK. Prague: Academia, Czechoslovak Academy of Sciences; White Plains, N.Y.: International Arts and Sciences Press, 1967. Pp. 382. $12.00.

Professor Šik is a member of the Central Committee of the Communist Party of Czechoslovakia and Director of the Economic Institute of the Academy of Sciences in Prague. The book under review is a translation of a substantially revised Czech text, published in 1964. It condemns direct central planning in a developed socialist country, and advocates a far-reaching replacement of central economic command by material incentives and allocational functions of markets.

In Part I Šik takes to task "Stalin's erroneous methodology," his insistence on the "primacy of production without regard to different phases of the production process," his neglect of the "distribution theory" (by the latter Šik obviously means not only theory of distribution but also theory of intermediate and final demand), and his refusal to recognize the importance of market relations ("commodity-money realtionship") in the socialist sectors of national economy. The author finds that much of Stalinist economic theory has survived Stalin in the USSR, but he has words of praise for the Polish economists, especially for Oscar Lange. He then discusses what he considers to have been the outcome of the old Soviet economic model in Czechoslovakia, the so-called "extensive development." By this he understands economic growth based on rapidly increasing input of capital accumulated through forced saving, and on rapidly increasing input of labor, while the productivity of these factors is stagnating, or even decreasing. One aspect of "extensive" develop-

ment is a tremendous rise in the incremental capital-output ratio. Šik measures this somewhat inaccurately by "investment in production per one koruna of annual increment in national income" (the latter defined as net material output at constant market prices). In these terms, the ratio jumped from 2.01 in 1958 to 13.90 in 1962 and 18.22 in 1963. Other characteristics of "extensive growth" are waste of material inputs, increasing cost of production, accumulation of unsaleable inventories of intermediate and final products, and losses in foreign trade.

Sooner or later, "extensive development" becomes self-defeating and the only possibility of sustaining growth is an "intensive development" under which an improved quality of factors, especially better technology, and an improved allocational efficiency become the main sources of growth. The necessary prerequisite, according to Šik, is a consistent use of socialist market relations in the framework of indirect macroeconomic planning.

In the lengthy Part II, the author argues in favor of decentralized economic decision-making by socialist managers who are supposed to "maximize gross income of the enterprise." Gross income is a misnomer: essentially it is total revenue minus material cost, that is, a loose analogy to the Western concept of value added. Obviously, it is impossible to maximize value added unless there is no scarcity of factors; and a profit-maximizing firm would tend to maximize value added only if the price of primary factors is zero. What the socialist firms actually may maximize in Šik's model is the *residual* of "gross income" after payment of centrally fixed wages, of interest on loans, and of special levies or "charges" on employment, on working, and on fixed capital. What is left thus comes close to the Western concept of a firm's profit. If a quasi-profit-led socialist market economy is to operate without return to direct central controls, prices must not deviate dramatically from relative cost to producers and from relative preferences of buyers. Šik's emphasis on the "movement of prices" to secure "a continual surmounting of contradictions between the narrow interests of producers and the narrow interests of consumers" is of special interest in this connection.

Problems of socialist price formation are further discussed in Part III. Unfortunately, this is an almost impenetrable mixture of the Marxian construct of "production price" and a vague theory of equilibrium prices on the wholesale and retail level.

With the exception of the equation of the production price (p. 250), based on a questionable, linear cost function, no functional equations and no graphs are used to inquire into the interrelationship of the prices of products and inputs. Šik seems to have no clear concept of production and consumption functions. He also seems to make no clear distinction between static partial market equilibria, a general equilibrium, and an insufficiently identified concept of optimality. What is especially surprising in his discussion of the blessings of (hopefully competitive) socialist markets is the virtual absence of inquiry into the problems of external economies and diseconomies, into the different time horizon of the managers and workers who receive short-term bonuses on one hand, and of the long-term oriented planners on the other, and into the possible conflicts between static efficiency and some macrodynamic goals.

The final Part IV deals with "money under socialism." A major portion of it is devoted to foreign trade and the balance of payments. While probably not realizing that "purchasing parity exchange rates" are not tantamount to equilibrium rates, Šik makes a laudable effort to recommend the removal of "artificial barriers" between domestic and foreign trade prices under a more realistic exchange rate of the koruna.

Those readers versed in quantitative economic analysis will feel somewhat frustrated by Professor Šik's vague, non-interrelated theorems, his failure to define clearly the parameters and the variables of his model, and his apparent lack of profound knowledge of modern Western theory. Even those readers who are interested in socio-economic systems rather than in pure economic theory may find several arguments either inconsistent or arranged in a very unusual sequence, many terms and many statistics underdefined, and the translation shaggy. Yet, despite all of its imperfections, this is an important study in political economy. Anyone who is interested in the changing economic systems in Eastern Europe and in the changing Marxist economics should not fail at least to leaf through it. It shows the painful Communist rediscovery—and perhaps even a certain overrating—of the allocational role of markets as well as the still substantial, but obviously narrowing, gap between Western and East European economic thought.

To be fair to the author, one should bear in mind that his interest is not limited to economic matters. In several chapters, he also discusses a general reform of a socialist society. His call for decentralization of economic power has contributed to the recent "socialist democratization" of Czechoslovakia.

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*Economic Systems.* By GREGORY GROSSMAN. Englewood Cliffs, N.J.: Prentice-Hall, 1967. Pp. viii, 120. $4.95; paper, $1.75.

This volume in the Foundations of Modern Economics Series provides a long-needed concise survey and summary of the field of comparative economic systems. It consists of eight short chapters—three introductory chapters dealing with performance criteria, economic institutions, and ideologies; two chapters on laissez faire and regulated capitalism; case studies of the Soviet Union as a command economy and Yugoslavia as a socialist market economy; and a concluding chapter summarizing some of the main points of the book and evaluating their significance.

The book can be used effectively at three different levels. First, it will admirably serve the main purpose of its series as a supplement to principles texts. The discussion of economic systems is commonly the weakest section in a principles text, usually appearing to be an afterthought following the extended treatment of the U.S. economy to which the book is really devoted. This approach unfortunately ignores the very strong student interest in alternative economic systems and their similarities and differences in comparison with the regulated capitalist economy, of which the United States is only one example. Students and teachers alike will welcome this volume as an introduc-

tion to a basic subject which their principles texts slight, if not ignore.[1]

Second, though not designed primarily for use in specialized intermediate-level courses in comparative economic systems, the book can be used with profit in these courses to provide a brief but comprehensive and authoritative overview of the subject. The price of the paperback edition is low enough to permit its purchase along with one or more of the longer texts and/or readers in the field. Instructors and students will find that Grossman's volume supplements rather than duplicates these volumes.

Finally, the book will be of interest and benefit to instructors because it provides an excellent concise summary of the field, with insights and examples that will find their way into lectures. The text contains many helpful references directing readers to both seminal literature and significant contemporary discussions. A list of selected readings at the end of the book indicates other important titles in the field. The book itself is well indexed.

Throughout, the approach of the book is analytical rather than descriptive, although enough factual material is presented to buttress the theoretical and institutional analysis. The treatment of the various topics is sophisticated and comprehensive, considering political and social aspects where relevant. At the same time broad and deep, it reveals Grossman's unusual grasp of the field of comparative economic systems. In dealing with controversial and ideologically sensitive matters, he is fair and judicious, cautioning the reader, for example, against improper comparison of an idealized model of capitalism with imperfect Soviet reality. Most striking is the fact that his case studies are presented and analyzed within the theoretical framework developed at the beginning of the book. This feature provides a coherence lacking in a number of books in the field, which fail to apply in the case study portions the basic concepts set forth in the earlier "theoretical" chapters. The literary style is clear and many specific examples are included to illustrate points, although some readers may find the sentence structure difficult at times because of the frequent insertion of parenthetical qualifications.

This reviewer was particularly pleased with the treatment of a number of topics, including the comparison of the abstract laissez faire perfect-competition model of capitalism with the complex reality of modern, imperfect, regulated capitalism; the nature and features of planning (commonly overlooked in principles texts); direct vs. indirect controls; the pros and cons of nationalization; a brief survey of the different types of economic planning in selected West European countries; and similarities in the bureaucratic nature of enterprise management in large private and public enterprises in the West and public enterprises in the East.

A reviewer of such a concise survey can always identify topics which he wishes rigid space limitations had not prevented the author from discussing further, or indeed discussing at all. Thus, for example, I would have liked a more explicit treatment of the central planning model, some mention of fascism in the chapter on ideologies, and an explanation of the role of producer

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[1] A notable exception is Heinz Kohler, *Scarcity Challenged: An Introduction to Economics,* New York, 1968, which compares how different economic systems attempt to deal with the same problems.

cooperatives in Yugoslav agriculture, where co-operation is considered an economically and ideologically acceptable compromise between individual and collective enterprise. However, I would be hard pressed to designate what should be eliminated to make room for these and other possible topics, given the severe space limitations imposed on the author by the format of the series of which the book is a part.

Although this is not the place to list minor misprints and errors, one which may confuse or alarm some readers should be mentioned. The table of contents incorrectly lists Chapter 7 as dealing with "The Soviet Market Economy: Yugoslavia." In the chapter itself, Yugoslavia is properly described as possessing a socialist market economy which emerged as a reaction to experience with the Soviet-type economy.

MORRIS BORNSTEIN

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## Business Fluctuations

*Information, Expectations, and Inventory Fluctuation: A Study of Materials Stock on Hand and on Order.* By RUTH P. MACK. National Bureau of Economic Research Studies in Business Cycles, No. 16. New York: Columbia University Press, 1967. Pp. xii, 306. $10.00.

For more than a decade, Dr. Mack has studied inventory fluctuation and its place in the vertical production-sales sequence. In this major work on the inventory behavior of department stores and durable goods manufacturers, analysis, as in her earlier works, is focused on the impact of shifting market conditions on stocks. The topic is complex; relevant data are scarce and, as Dr. Mack notes, the subject lends itself poorly to formal analysis. The importance of the topic and the high caliber of her analysis, however, should reward the determined reader. For the specialist in this field, this is an essential book.

In the first three chapters the author summarizes briefly the inadequacies of existing explanations of inventory behavior, explains the uses and determinants of stock holding by business enterprises, and describes the time-series data to be used in examining the vertical sequence of flows and stocks. Chapters 4 through 8 contain a detailed exposition of how materials stocks and outstanding purchase orders for materials behave. The two combined—termed "ownership"—are examined separately and in combination for durable goods manufacturers and for department stores, using the National Bureau's business cycle chronology. In Chapter 6, rates of change are also discussed, while flows which bound stocks levels—sales and new orders to suppliers—are analysed together in Chapters 7 and 8. Chapter 9 to 13 are devoted mainly to explaining the findings. The link with sales as well as conditions in markets in which materials or merchandise are purchased are examined for their contribution to fluctuations in ownership. Rough sketches of the inventory models seemingly most appropriate for department stores and for durable goods manufacturers are then given. The contribution of inventory and purchase orders to business cycles is shown next. The book concludes with a chapter in which an "ecologi-

cal" theory of inventory behavior is offered, centering on the concept of owner-ship.

The concept of materials ownership, which comprises materials stocks on hand and on order, is the hallmark of this book and the author's earlier work. What Dr. Mack has done, in effect, is to redefine the dependent variable employed in most inventory models where the behavior of stocks alone or of changes in stocks is viewed as a lagged function of sales or expected sales and unfilled orders. These models are essentially sales-accelerator models, dating back to Lloyd Metzler's pioneering work in the 1940's, that employ a form of period analysis in which businessmen adapt production to changes in sales only with a lag, thereby generating changes in inventories. Despite later refinements (Richard Goodwin's "flexible accelerator," the incorporation of distributed lags, the more sophisticated sales-expectations hypotheses of Michael Lovell and others) the models have remained unsatisfactory in several respects. Dr. Mack argues that the sales relationship fails to explain a large and varying portion of inventory behavior; when unfilled orders (dominated by backlogs of orders for machinery and equipment) are included, they explain too much; a larger portion of inventory investment is unintended than seems to make sense.

By redefining the inventory variable to include stocks on order, the author has shifted the emphasis to avoid or mitigate these problems. The impact of sales on inventory behavior is now shared with materials markets conditions. The ease of placing purchase orders allows sufficiently rapid response to actual or perceived market changes so that unintended stocks can be ignored (p. 211). The benefits which derive from this change in emphasis, however, may be offset by the author's failure to consider stocks held at higher stages of fabrication. She examines neither the relations between materials, in-process, and finished stocks nor the behavior of the total. Observed relations between sales or other variables and ownership may not be duplicated, for example, in the link between stocks of finished goods and sales. More important, changes in holdings of in-process and finished stocks may be competitive with the sales link and market conditions, the two principal causes of fluctuation in ownership examined.

Ownership behavior is illustrated mainly through time-series data (1946 through 1963) on sales, stocks, and outstanding purchase orders for a sample of large department stores, and through information for a similar period on shipments, stocks, and outstanding orders of durable goods manufacturers. As Dr. Mack notes, the data are not ideal mainly because the vertical chain of demand cannot be extended backward to show sales and purchases for supplier firms, and because the vertical sequence for durable goods manufacturers is distorted by over- and under-inclusiveness of the statistics. An admirable job has been done to overcome such difficulties by incorporating information on spot metals prices, vendor performance, and other material which helps to reveal conditions in materials markets. The author is scrupulous about acknowledging sources of weakness in her results, but one potential difficulty inherent in the use of highly-manufactured time series in the context of the National Bureau's business cycle chronology is not brought out. Measures of lead and lag and measures showing percentage of months in like phase for dif-

ferent series are used to establish regularity of relationships. When time series are smoothed by using moving averages, lead-lag relationships and measures of conformity may be sensitive to the smoothing technique employed. The possibility should not be ignored.

At the risk of oversimplication and bluntness of emphasis, results can be summarized as follows: average materials ownership during the period was large relative to sales or shipments; outstanding orders were more important relative to stocks for durable goods manufacturers than for department stores; ownership and its components conform to postwar business cycles; swings in outstanding orders are larger than those in material stocks and lead, especially at cycle peaks; a long lead in change in outstandings over inventory investment at peaks for manufacturers is not matched for department stores; during early expansion, outstanding orders and ownership display a more than proportional rise or thrust; new purchase orders of department stores have a "whip" effect in which such orders rise and fall by a large multiple of the *subsequent* changes in sales; for durable goods manufacturers, unlike department stores, sales and purchase orders are roughly synchronous; durable goods manufacturerers maintained a much looser sales-inventory objective than department stores; the proportion of fluctuation in ownership explained by sales, even under the most conservative hypotheses, is relatively small.

Fluctuations in ownership must thus be explained by other variables in addition to sales: conditions in materials markets and the possible influence of profits on attitudes toward inventory handling costs are chosen as additional, likely determinants of ownership behavior. The analysis is extended to cover the phenomenon of ownership thrust, for example, by examining probability distributions attached to price expectations and "the proclivity to gain from price-timed buying," various response lags, and the feedback which leads to self-reinforcing expectations. This is what seems to be meant by the author's term "ecological process" in the context of inventory analysis.

The book concludes with a description of an inventory cycle generated by price-timed buying, suggested directions for further study, and a warning of the difficulties likely to be met in adding quantitative dimensions to the model by the application of econometric analysis. These difficuties have all been met before and one would hope that they are not insoluble here, for in deriving an ecological model of inventory behavior, the author has in effect issued an invitation to establish the quantitative significance of the relationships she has set forth so well.

P. W. KUZNETS

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## Money, Credit, and Banking; Monetary Policy; Consumer Finance; Mortgage Credit

*Les choix financiers et monétaires: théorie et technique modernes.* By S.-CH. KOLM. Paris: Dunod, 1967. Pp. viii, 331. F 58.

Professor Kolm's elegant and compact, beautifully produced treatise on financial-portfolio choice merits careful scholarly attention (which will be

impeded by his failure to provide indexes, although the book has many detailed analytical conspectuses). Since the book mostly is synthetic rather than plastic and problem-oriented (although exercises are avoided), it probably has special interest for graduate students. Indeed, as I explain below, *Les choix* may be a little too pat: perhaps economics, at heart, is intractable to science-engineering approaches. And, for me much of modern French economics—technically brilliant, calling for much more attention than Anglo-Saxons are paying to it—evokes this same unease.

The 18 chapters of *Les choix* are distributed amongst three parts. The first centers on the role of risk in portfolio-selection theory, the second on theorems of optimal portfolio choice defined on mathematically well-behaved sets, the third, *Les actifs de paiement*, on demand for money, emphasizing inventory theory, together with some "Patinkin Business," including "money in the utility function," "invalid dichotomies" and the Walrasian formulation of monetary demand. Kolm has complete mastery of his materials whilst gracefully deploying a formidable mathematical technique over virtually the whole range of the theory of portfolio choice. So, nodding to Dr. Markowitz, he makes portfolio-choice theory virtually as accessible as are the theory of producers or macrodynamics.

I might raise four critical points. First, insufficient attention is paid to the highly subjective nature of the relevant expectations: much deeper analysis of Bayesian statistics and implications of impossibilities of parameter specifications is called for. Secondly, and related to (1), the role in life of information costs and of the theory of information search is much more important than its bit part in *Les choix* (cf. pp. 54-66). Thus Kolm's problems mostly concern maximization of a utility function over feasible-portfolio sets relative to parametric risk properties. But in life the investor must be seriously concerned with (admittedly subjective) confidence limits attached to estimates of variances of yields, market prices, etc. And these properties can, so to speak, be produced by the investor through information search: the stochastic properties of alternative portfolios are endogenous in realistic problems. So the nexus is rather more complicated in a very important way than Kolm's central analysis suggests: not only in bridge is a peek worth two finesses. (To be fair, Kolm interestingly analyzes the problem of changing the portfolio space itself.) Thirdly, the treatment of sequential choice is but slight, although references to dynamic programming and the Pontryagin Maximum Principle reveal Kolm's awareness of this topic. Still, perhaps it makes little sense to worry about extended economic horizons so long as information lacunae are so gaping and fads and hysterias are so important in bourses. Fourthly, the discussion of demand for money (mostly in Part 3) is unsubtle. Are not financial spectra so dense that particular substances, labelled "M" for various practical purposes, cannot categorically be singled out for purposes of portfolio theory? A single illustration suffices: how different is unused overdraft facility from "M" in a theory of *la dynamique d'encaisse?* Paradoxically, one of the great virtues of the first twelve chapters of *Les choix* is that they make it so easy to see why financial sepctra *are* so dense.

The weight of my criticisms is slight in the balance.

Finally, a few words about implications which may be drawn from *Les choix* for the theory of monetary policy. Its bulk leads up to important implications only in statical general-equilibrium models of economic policy à la Tinbergen; thus changes in the term structure of interest rates sustained by debt-management authorities would feed into portfolio-optimization programs, leading up to changes in excess demands for financial paper, finally influencing commodity markets. I much doubt if Kolm's austere algebra could handle short-term effects of a drastic credit squeeze leading to loan recalls, irregularly plunging share prices, rumors of revaluation of gold, etc. *Les choix* does not much penetrate the operational problems of portfolio managers in untranquil conditions, possibly because Kolm finds bourses uncomfortable. Perhaps this is fortunate: a City man could not have produced this beautiful book.

<div align="right">M. BURSTEIN</div>

*The University of Warwick*

*Essays in Monetary Economics.* By HARRY JOHNSON. Cambridge, Mass.: Harvard University Press, 1967. Pp. 332, $7.50.

In his preface Harry Johnson writes: "This volume brings together essays and articles in the general field of monetary economics prepared for a variety of purposes over the past four years. The main reasons for collecting them in this fashion are that they appear to have been found useful for teaching purposes . . . and that they have been published in widely scattered . . . volumes." There are three parts to this book. Part I contains his survey of monetary theory, published, in the *AER* (1962). It is followed by two lectures which resurvey "much the same material, but at a less difficult level. . . . " Chapter 4 contains some material which has not been published before, and "deals in what is hoped is a relatively simple way with the complex problem of the role of money in growth models." Parts II and III are devoted to policy problems. The former discusses monetary and fiscal policy in the United States and Canada; and the latter is concerned with these problems in developing countries. Every chapter is lucid. The exposition represents a balanced judgment of recent thinking; and alternative points of view are considered fairly.

It is advisable to concentrate upon Chapter 4 which contains material which has not heretofore been published. This chapter is a development of James Tobin's 1965 paper in *Econometrica*. Three aspects of this chapter will be discussed.

First, Johnson maintains that when the utility yield on real balances is explicitly considered, a rise in the rate of price inflation could either raise or lower the long-run capital intensity. That is, the ratio of real savings to output could either be raised or lowered by such a policy. Tobin defined disposable income per worker $y'$ as $y+bgy$ where $y$ is current output per worker and $bgy$ is the current increment of real balances per worker. Variable $g$ is the growth rate of real balances equal to the growth rate of output and $b$ is the (desired equals actual) ratio or real balances per unit of current output. Consumption per worker was $(1-s)y'$ in Tobin's model. Johnson

defines disposable income per worker as $y'' = y' + u(b)y$ where $u(b)y$ is the imputed value of real balance services per worker, measured as an integral under a demand curve. Consumption of goods per worker is $(1-s)y'' - u(b)y$ and $u(b)y$ is consumption per worker of the services of real balances. We, therefore, derive (1) the ratio of consumption of goods per unit of current output $c/y$ or (2) the ratio of real savings (investment) per unit of current output $s^*/y$. These ratios sum to unity.

(1) $$c/y = (1-s)[1 + bg + u(b)] - u(b)$$

(2) $$s^*/y = s[1 - (1/s - 1)bg + u(b)].$$

The demand for real balances per unit of output $b$ is negatively related to the proportionate rate of price change $\pi$. A rise in the latter, given $y$, may raise or lower $c/y$. The partial derivative $\partial(s^*/y)/\partial\pi$ has an ambiguous sign. Johnson concludes that the effects of a rise in the rate of price change are ambiguous in terms of their effects upon the long-run capital intensity.

This approach is troublesome for several reasons. Suppose that the economy were not growing $g = 0$ and real balances per worker were suddenly increased. What would happen to the demand for consumer goods per unit of output? From (1), with $g = 0$ and given $y$, we derive:

(3) $$\frac{\partial(c/y)}{\partial b} = -su'(b) < 0, \qquad \text{since } u'(b) > 0.$$

The demand for consumer goods will *decline* as a result of the rise in real balances per worker. This is a remarkable result which is not pointed out to the reader. Were Pigou, Patinkin, and Johnson (in the earlier chapters) wrong in thinking that a rise in real balances raises the consumption function for goods? Johnson does not derive his consumption-savings function from any explicit model of consumer behavior as did Uzawa, Sidrauski, Samuelson, and Diamond. The consumption function is simply postulated. We may, therefore, conclude that: either Johnson's function is correct and Pigou, Patinkin, etc., were wrong about the direction of the real balance effect or that Johnson's function is not a correct description of savings behavior.

Second, he asserts "that what is basically responsible for the nonneutrality of money in the models analyzed is the assumption that money is . . . an asset with a return fixed in nominal terms. . . . " Unfortunately, no proof of this statement is presented in the form of a model; and the reader is not likely to be convinced. The essence of monetary growth models is that an additional store of value is introduced which has an endogenously determined real yield: the nominal interest on money plus the rate of deflation. Variations in the growth rate of this asset affect the equilibrium yield on real capital. Johnson writes: " . . . neutrality would be assured by assuming that monetary arrangements guarantee holders of money a rate of return on their real balances equal to the rate of return available on real investment." His suggestion, in effect, assumes away the problem of determining the yield on money as an endogenous variable. Is this interesting? Does he not thereby discard one independent store of value?

Even if all money were of the inside type, nonneutrality could be produced. Following the spirit of his model, disposable income would be $y^* = y + u(b)y$: to the flow of output of goods (exclusive of the services of real balances) add the flow of services of the real balances produced by the banking system. With inside money, we exclude $bgy$ from disposable income. The ratio of real savings to output $s^*/y$ is:

$$(4) \qquad\qquad s^*/y = s[1 + u(b)].$$

Since $b$ is negatively related to the rate of price change $\pi$, nonneutrality occurs in an inside money model: i.e., $\pi$ affects the ratio of real savings to output. Of course, this formulation is amenable to the same criticisms that were directed to (2).

Third, Johnson tried to present a complex problem in a simple way, using graphs rather than mathematical proofs. The exposition is heuristic rather than rigorous; and many will welcome such an attempt. Others may feel that if a picture is worth a thousand words, an equation is worth three pictures. As a result of the heuristic approach the reader is not shown under what conditions the equilibrium is stable or unstable. In fact, Tobin's system (which is the basis of Johnson's model) is dynamically unstable; and Johnson's could also be unstable.

Monetary growth theory is in its infancy. In another five years we may expect from Johnson a survey of this field of the same quality as his survey of monetary theory which is reprinted as chapter one of this book.

JEROME L. STEIN

*Brown University*

*Monetary Process and Policy: A Symposium.* Edited by GEORGE HORWICH. Homewood: Richard D. Irwin, 1967. Pp. xi, 388. $8.50.

The third annual Conference of University Professors sponsored by the American Bankers Association was held at Purdue University from August 29 to September 1, 1965. The Krannert Graduate School of Industrial Administration served as co-sponsor. This volume includes fourteen invited papers, seven discussants' comments, and other comments by participants. For reasons that are not made clear, there are prepared comments on some, but not all, of the invited papers. The major papers are by Paul Samuelson, "Stabilization Policies in the Contemporary U.S. Economy"; George H. Hildebrand, "Structural Unemployment and Cost-Push Inflation in the United States"; Albert Kervyn, "Inflation and Stabilization Policies in Western Europe"; Warren L. Smith, "Is the Growth of Private Debt a Cause for Concern?"; Tilford C. Gaines, "Financial Innovations and the Efficiency of Federal Reserve Policy"; John H. Wood, "A Model of Federal Reserve Behavior"; Frank de Leeuw, "The Demand for Money: Speed of Adjustment, Interest Rates, and Wealth"; Karl Brunner and Allan H. Meltzer, "The Meaning of Monetary Indicators"; S. Posthuma, "Harmonization of National Monetary Policies"; J. Marcus Fleming, "The International Monetary System and the Reconciliation of Policy Goals"; Hyman P. Minsky, "Money, Other Financial Variables, and Aggregate Demand in the Short Run"; Robert H. Strotz, "Empiri-

cal Evidence on the Impact of Monetary Variables on Aggregate Expenditure"; Daniel H. Brill, "Criteria for the Conduct of Monetary Policy—The Implications of Recent Research, for the Federal Reserve"; and G. L. Bach, "Criteria for the Conduct of Monetary Policy—The Implications of Recent Research, for Academia." The editor has pushed his material through to publication in a reasonably short time but not rapidly enough to avoid being overtaken by the fourth Conference of University Professors on monetary problems. (See last paragraph below.)

It is almost traditional to say at this point that "as is usually the case, these papers differ widely in quality, etc." Actually, though differences are evident, all of the contributions are serious efforts by competent investigators to rise to the occasion. Of course, a reviewer can do no more than sketch the contents of this sort of volume.

Samuelson's keynote address emphasizes the success of economic policymaking in recent years while reminding his listeners-readers of unresolved problems. Hildebrand looks into two alleged difficulties—structural unemployment and cost-push inflation—and concludes that unions have made a major contribution to inflationary pressure and unemployment in recent years. Lowell Gallaway agrees with the conclusion but disputes the analysis underlying it. Arthur Ross disputes the conclusion. Kervyn presents some interesting descriptive material on developments in Western Europe (focusing on the years 1962-1965) together with some speculations on possible future trends. Smith's paper concludes that the increase in private debt that has been taking place in the United States is not unduly worrisome. It appears to be a problem only insofar as it increases the economy's sensitivity to deflationary shocks. Though I agree with most of Jacob Cohen's remarks on the Smith paper, those interested in the subject will undoubtedly find the Smith paper plus the comments by Cohen and Roland Robinson useful reading. Gaines' paper contains many interesting observations, as one would expect when the writer is looking at monetary problems from a different point of view from many of us; but the paper is marred by his uncritical espousal of a special version of the "Gramley-Chase" thesis that the Federal Reserve has no control over the supply of money. Perhaps I should say that I am one of those economists who regard the Gramley-Chase and related views as partly right and provocative, but quite baffling in certain respects. Unless one accepts the liquidity-trap hypothesis that banks have an infinite demand for excess reserves, banks will create deposits when they try to reduce their reserve-to-deposit ratio by (say) purchasing existing assets. Furthermore, what Gramley and Chase are saying is, in part, that the identification problem extends down to the bank decision-making level. One can grant this and still argue that a money-supply hypothesis which embodies some characteristics of a reduced form may be useful.

Wood's paper is one of the most stimulating papers in this volume. Wood wrestles with a fact that everyone has always "known" but few have attacked systematically; namely, that Federal Reserve policy is an endogenous variable in the economic process. He doesn't get too far, but what he does is promising. Holding all aspects of monetary policy other than the Fed's portfolio of government securities constant, he investigates the extent to which this instrument appears to respond to target values for GNP, the balance of payments

surplus, the rate of unemployment, and the price level (for example, the target value for GNP is similar to "potential GNP" as estimated by the Council of Economic Advisers, the target for the price level is no change), and to movements in the actual values of these and some other variables. He finds that the largest part of open-market operations is ascribable to "defensive operations," but the remainder is systematically related to the targets and other variables.

De Leeuw's study is a valuable addition to econometric work on the demand for money. It is especially noteworthy for the evidence that demand responds with a long lag to changes in the parameters. See Harry Johnson's comment on this finding.

When is monetary policy easy and when is it tight? Brunner and Meltzer give further attention to this question. As they point out in a rejoinder to Samuel Chase, any endogenous variable can serve as an indicator if we have correct and complete knowledge of the system. But what if we do not? I will not try to summarize the arguments for and against their conclusion that the quantity of money in the exclusive sense is a better indicator of monetary conditions than money in the inclusive sense, commercial bank credit, interest rates, or free reserves.

I have already used up most of the space allotted to me and six major papers remain unmentioned. In a paper ranging rather widely over the assigned subject, Posthuma is relatively optimistic regarding restoration of equilibrium in the balance of payments between America and Europe. Fleming's contribution is a useful analysis of balance of payments problems that concludes with support for the "wider spread" or "moveable band" system of exchange rates. Minsky presents a "portfolio-approach" paper on the short-run impact of monetary policy which struck me, like his discussants, as a not-fully-developed discussion containing a number of promising avenues for further development. Strotz's contribution is a well-written, judicious summary of recent empirical work which, unfortunately, as David Meiselman points out, does not cover some of the most recent research. Thomas Mayer also makes some relevant comments on the Strotz paper.

Brill refers in the conclusion of his paper to his "ill-tempered remarks." In fact, he presents a rather temperate view of how recent research looks from the catbird seat of the policy maker. (Some of the replies and rejoinders at the end of the volume are a little warm.) Bach, asked to speak for academia, does not really take a position very different from Brill's, perhaps because he has served so long in the role of consultant. Both, of course, lament the gaps in our knowledge. No responsible monetary economist could do otherwise. But I would argue somewhat with the tone of their remarks. In view of the virtual demolition of the free-reserve-concept, the resurrection of the quantity of money as a respectable instrumental variable, etc., surely the situation is significantly different from what it was ten years ago, not to speak of points in time farther back in the history of our attempt to overcome ignorance.

Tastes differ, but my award for crisp writing in this volume goes to Jacob Cohen. He did lose me temporarily where he says: "Gaines' paper, with its defense of an antiprinciple . . ." [that the Federal Reserve cannot control the quantity of money].

While I was engaged in preparing this review, the proceedings of the 1966 Conference of University Professors sponsored by the American Banking Association, edited by Harry G. Johnson, appeared as a supplement to the August 1967 issue of the *Journal of Political Economy*. Work that appears in journals is seldom reviewed in the usual sense of the term. And I was afraid that if I asked the editor of this publication for a clarification of my assignment, he would enlarge it. Suffice it to say that the fourth conference produced more papers that should be read by the really up-to-date monetary economist. Topics covered included the subject of monetary indicators raised by Brunner and Meltzer at the 1965 conference, regulation of financial institutions, balance of payments adjustment, the term structure of interest rates, and monetary experiences of less developed countries.

<div align="right">H. LAURENCE MILLER, JR.</div>

*Carleton College*

*Incomes and Money.* By RALPH HAWTREY. New York: Barnes and Noble, Inc., 1967. Pp. xv, 260. $7.50.

Sir Ralph Hawtrey presents a critique of postwar monetary policy. He feels that excessive reliance has been placed on incomes policy as a means of controlling inflationary pressures in the United Kingdom; incomes policy must be supported more effectively by monetary policy than has been done to date. The heart of credit policy is, as Hawtrey has maintained through the years, a "free use of Bank rate."

Nearly half of the book is devoted to a restatement of Hawtrey's familiar monetary theory of the business cycle. The prime mover in the economy continues to be the trader who expands or contracts inventories in response to small changes in the interest rate. Economic stability can be maintained only though timely changes in the central bank discount rate; the conventional attention to reserve ratios has resulted in the past in a lagged response of monetary policy to business conditions and an intensification of the business cycle.

Hawtrey recognizes that the role of the short-term rate of interest as a regulator of credit has been questioned in recent years. However, he feels that the locus of theoretical arguments against his theory is in Keynes' *Treatise on Money*, and his rebuttals are devoted to this work (pp. 72-75). He again charges the Radcliffe Committee, which in its Report concluded that interest costs bore a relatively insignificant relationship to the decisions regarding inventory investment, with misinterpreting the evidence and concludes ". . . that the balance of opinion to be derived from a scrutiny of the recorded evidence seems to have been very definitely on the side of sensitiveness of stock holding to the cost of borrowing" (p. 80).

British monetary policy is largely responsible, in Hawtrey's view, for the international spread of the business cycle. After the Bank of England started using Bank rate as a means of credit policy in the 1950s, British monetary policy is said to have had an impact on U.S. business conditions: "Twice a 7 per cent Bank rate in London has resulted in an unemployment percentage of nearly 7 in America" (p. 115). Thus, he believes, appropriate British monetary policy is of key importance for international stability.

The starting point of his analysis of postwar policy is a belief that the pound is undervalued and that inflationary pressures are introduced into the British economy via the export industries, creating a demand for credit and upward pressures on wages and prices. Imports, in turn, have risen in response to higher incomes; the net results has been a persistent balance of payments deficit.

Hawtrey contrasts the British and German experience: "Undervalued money has given Germany a favourable balance of payments ever since 1951. It did not do the same for Britain, because Britain never consistently kept the credit situation under control. The authorities were committed to the 'expansionist' policy, which was to ensure full employment by expanding demand" (pp. 137-38). The basis for his claim that the pound is undervalued appears in a few summary tables relating earnings and productivity in various countries. He concludes that the degree of undervaluation vis-à-vis the dollar before the 1949 devaluation was 17 per cent; undervaluation at the end of 1964 is said to have been 15 per cent. Unfortunately, it is difficult for the reader to trace through Hawtrey's computations. As further evidence of the undervaluation of sterling, he cites ". . . overemployment in Britain and unemployment in America" (p. 119). Nowhere does he examine the actual U.K. export performance in the 1950s and early 1960s. This discussion is unconvincing.

Hawtrey relates the lack of success of incomes policy to the undervaluation of sterling: "Up to now persuasion has failed, because the undervaluation of the pound and the consequent excess demand for labour have inexorably impelled wages upward" (p. 168). What is needed, he says, is that credit conditions be tightened by raising Bank rate whenever the wage level threatens to rise faster than the prescribed rate. His enthusiasm for incomes policy is based on his belief that the Bank of England has reacted in the past only to the state of gold and foreign exchange reserves. The incomes policy provides the monetary authorities with a practical guide for stabilizing economic activity. The responsibility of the Bank of England is, accordingly, ". . . of so regulating credit that the flow of money will allow the prescribed increase in the wage level, and no more" (p. 193).

It is easy to take issue with this work. But we should remember that Hawtrey wrote this book more than twenty years after retiring from a long career in the U.K. Treasury. It is splendid that he has been able to keep abreast of the events of the day and to give us the benefit of his analysis.

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## International Economics

*Capital Movements and Economic Development.* Edited by J. H. ADLER WITH P. W. KUZNETS. New York: St. Martin's Press; London: Macmillan, 1967. Pp. xxxiv, 497. $12.50.

Long-run international capital movements (ICM) are means of unilateral resources transfer across the national frontiers to promote economic growth.

To fully understand ICM, one must be aware of the *purpose* (i.e., the economic function) and the institutional arrangement under which they take place. Topics under reach heading may include:

I. *Economic Function of ICM:* (a) Causes of ICM, (i) supply of savings, (ii) demand for investment, (iii) rates of return, (iv) borrowers' qualifications; (b) Process of ICM, (i) mechanism as related to international trade, (ii) monetary accommodation; (c) Consequences of ICM, impact on production structure in the long run. II. *Institutional Arrangement for ICM:* (a) Suppliers' status, (i) private lending: corporate profit, household savings, etc., (ii) public aid: bilateral, multilateral, (World Bank, Consortium), etc.; (b) Contractual content, (i) private lending: direct, equity, bond, etc., (ii) public aid: tied to country (e.g., obligation to buy from the United States); tied to commodity (e.g., P.L. 480), etc.

This 500-page book, the Proceedings of a Conference held by the International Economic Association, tries to cover all these topics by dealing mainly with two unrelated experiences: the trans-Atlantic outflow of British private capital in the golden age of such lending in the period 1840-1915 and the post-World War II flow of public (mainly U.S.) funds to underdeveloped countries through foreign aid programs. Sixteen papers are divided into three parts. We shall refer to the tabulation above to facilitate our discussion of the papers.

While the British experience is an accomplished historic fact, the contemporary experience of foreign aid is an experiment still in progress. For this reason, it is possible for the analysis of the British experience (Pt. I, "The Historical Record," 200 pp.) to concentrate heavily on the economic aspect (topic I in the above table). In contrast, much of the analysis of the contemporary experience (Pt. II, "The Resources Aspect," 170 pp.) has to do with the design of the institution of foreign aid [topics II a (ii) and II b (ii)], which must be concerned with such matters as aid administration and must be affected by contemporary problems (e.g., U.S. balance-of-payment problems) above all, politics. Thus Part II takes on a more heterogeneous and less organized form than the other parts of this book. The last part (Pt. III, "Monetary Aspects") is, on the whole, a more technical section on the process, or mechanism, of ICM (topic I b).

Inasmuch as the British experience lasted well over half a century, it takes an economist with historical interest and perspective to grasp this experience in its entirety. The purpose of a historical approach is, first, to provide a factual basis of events in quantitative terms and, second, to provide a theory. Of the two papers in Chapter 1, Professor Matthew Simon's "The Pattern of New British Portfolio Foreign Investment 1865-1914" is entirely factual and presents new data which the author processed with the aid of a computer, on the borrowers' qualifications [i.e., topic I a (iv)]. Thus, the maximum likelihood is that, in those days, a typical borrower was a private party (35 per cent) in a politically independent country (59 per cent) in North America (34 per cent) engaging in investment in social overhead, especially railroads (69 per cent), etc. The author also noted the complex set of fluctuations

which characterized British capital exports in this period, the most notable of which is the long swings.

In the second paper of Chapter 1, "The Historical Record of International Capital Movements to 1913," Professor Brinley Thomas attempts to theorize about the five prominent long swings observable over a century. The thesis is an inverse compensation mechanism in which the slackening of domestic investment activities in Britain was compensated for by investment (accompanied by capital *and population* transfer) in the capital-importing countries. Intuitively, such an analysis of the cause of ICM (topic I a) is appealing. Judging by modern standards, the theory is as yet too impressionistic and the analysis of the empirical evidence on the observed time patterns of terms and trade too primitive. However, the idea is sound and the approach promising.

The contractual content for private ICM [topic II b (i)] depends partly on the ethnical and cultural background of the borrowers. When the government in the borrowing country is primitive, the ICM may take on an imperialistic form of direct investment, namely the Chartered Companies, to exercise the full monopoly power (protected by political power) due to technology and managerial know-how. In the factual account of "The Financial Experience of Lenders and Investors" by Dr. Andrew M. Kamarck (Ch. 2), the experience of the Chartered Companies in Africa for some 60 odd years in the 20th century is reported. The paper does not go into the economics, i.e. the relevancy to economic growth, of these investments. The focal point of analysis seems to be the interests of the chartered companies (which can hardly be identified with the national interests in Africa), which did not fare well, so we are told.

The paper by Professors Saburo Okita and Takeo Miki is a historical view of the "Treatment of Foreign Capital, a Case Study of Japan." The following points have been brought out in clear focus in this Japanese model: (i) given favorable supply conditions, capital inflow may be the result (rather than the cause) of the momentum of industrialization (topic I a); (ii) the quantity of capital is not as important as the *quality* (i.e., the commodity, the service, and the technology imprint) of capital import (topic I c); (iii) the government can play a central and useful role in facilitating and guiding this inflow when it is conscious of the facts that economic growth is the primary objective and that the loans must be repaid. These are sobering lessons for borrowers and lenders in the contemporary world.

The last two papers in Part I (Rosenstein-Rodan, "The Philosophy of International Investment in the Second Half of the Twentieth Century" and Felipe Pazos, "The Role of International Movement of Private Capital in Promoting Development") are misplaced (and somewhat misnamed) as there is very little "historical" about them. Both papers are concerned with topic II b (i) the "contractual content" of privae ICM. Pazos' paper sounds like an ABC of the various contractual forms (e.g., "direct investment does not involve any transfer of ownership of the resources utilized"). The short paper of Rosenstein-Rodan tries to compare the suitability of bond vs. equity in the second half of the 20th century of private ICM to underdeveloped countries. It is, perhaps, still too early to talk about this topic.

For reasons mentioned earlier, the contents of the papers in Part II, on contemporary foreign aid experience, are heterogeneous for the reason that they are preoccupied with the evaluation of the imperfections of current institutions of foreign aid from diverse viewpoints. A fair number of these papers (Kafka, Gulhati, Patel) fall into a typical pattern of surveying a collection of loosely classified (but analytically unrelated) issues. The three other papers (Chenery, Onitiri and Haq) are more specific and better organized.

Alexandre Kafka in less than 20 pages examines no less than eight issues (e.g., capital import may discriminate against local entrepreneurship, cause misallocation of investment, cause liquidation difficulties . . .) to caution us against the retrogressive (i.e., antigrowth) effect of ICM. These "suggested possibilities" are not supported by any sort of statistics. Dr. Ravi I. Gulhati surveys three issues—the "need," absorptive capacity and debt servicing capacity—in a more systematic fashion. We are told that, for successful ICM, the importing countries must be aware of their need (which should be a "growth" rather than "humanistic" orientation) and debt-servicing capacity (which must finally rest on intuitive judgment). Under the elusive concept of absorptive capacity, Gulhati provides a useful catalogue of problems at the microscopic level (i.e., preparation, implemention and management of individual projects) and the macroscopic level (i.e., the allocation of investment fund to the totality of all projects according to "incremental capital output ratio," "socially acceptable discount rate," "marginal efficiency of investment," or other criteria). With respect to the latter, Gulhati recognizes that there is a wide gap between economic theories (intuition?) and the feasibility of application to the planning process.

As a practitioner of development planning, Dr. I. G. Patel, "Foreign Capital and Domestic Planning," first complains about the inadequacy of the Harrod-Domar type of planning framework (e.g., the constancy of capital-output ratio) and the omission of reference to absorptive capacity and income distribution. He then criticizes the imperfections of contemporary aid-giving institutions in respect to three issues: uncertainty, terms of repayment, and restrictions on use (i.e., tied aid). The last issue [i.e. topic II b (ii)] was investigated for Pakistan by Dr. Mahbubul Haq "Tied Credits—A Quantitative Analysis" to provide a statistical sense of the problem (e.g., Pakistan should be able to save $60 million if all $500 million is untied).

Dr. H. M. A. Onitiri's paper, "Capital Movements and the Volume and Terms of Trade," is directed at the "consequences of ICM" (i.e., topic I b) by examining the impact on volume and terms of trade through basic structural change in the underdeveloped countries precipitated by foreign aid. The evidence derived from post-war experience is probably still too scanty for us to speculate on this problem of long-run significance—beyond the much discussed (but mostly futile) topic of "import substitution" and "export promotion."

It takes an academician-practitioner (Professor Hollis B. Chenery, "Foreign Assistance and Economic Development") to write on the economic and administrative aspects of the foreign aid experience from the viewpont of the donors. The economic aspect contains a summary, as well as a preview, of the

approach of the Chenery (Bruno-Adelman-Strout) school which centers around the idea of viewing the growth promotion role of foreign aid in removing bottlenecks arising from the saving limit, the import limit (i.e. technological dependence on foreign goods), and the skill limit (i.e. deficiency in investment ability). The basic philosophy of this school is to view economic growth as a mechanical system the operation of which involves the activation and relaxation of certain binding behavioristic conditions and thus yielding different limits at different stages of growth. The administrative aspect contains a cataloguing of certain practical problems of the aid giver (e.g., the criteria governing the allocation of funds to different countries, project vs. program aid [topic II b (ii)] as well as speculations on the design for a more efficient aid-giving institution in the future.

The first paper in Part III (A. J. Brown, "Capital Movements and Inflation") covers three unrelated researchable topics which the author suggested with various degrees of factual backing. The first topic is whether or not price inflation in Latin America has adversely affected the quantity and contractual form of capital inflow. The second topic is on the role of price inflation as a part of the transfer mechanism (topic I b) in the post-World War II setting. The third topic is on the long-run impact on the absolute price level caused by long-run structural change (topic I c). The reviewer feels that the third issue is not a meaningful research topic while the first two issues are dealt with by other papers in Part III.

The first topic is picked up in "Private Capital Movements and Exchange Rates in Developing Countries," by Dr. Rudolf R. Rhomberg, who explains *why* inflation does not deter private equity capital inflow [topic I a (iii)]. If the purchasing power parity theory of exchange rate holds, the effect on anticipated returns in foreign currency of domestic inflation is obviously neutral. When the PPP-theory does not hold, as is the case in the short run, the factor that does deter capital inflow is uncertainty. The second topic is picked up by Professor R. A. Mundell, "International Disequilibrium and Adjustment Process," where in the construction of a model of disequilibrium adjustment incorporating price level, quantity and demand for money, balance of payments, and aggregated demand, Mundell shows how this model can be applied to the transfer problem as well as to a few other problems "in theory." The reviewer suspects that it will be a long time before the underdeveloped countries can develop the kind of economic institutions, with behavioristic sensitivity required by the model, to verify the validity of this model empirically.

The last paper, Javier Marquez's "Financial Integration and the Flow of Resources in Latin America," concentrates on the experiment of institution design for "financial integration" of countries in Latin America in recent years. In the absence of a precise economic definition, financial integration can cover a host of international cooperative enterprises (from Latin American Common Currency, Custom Union, Clearing Union, Bank, down to periodic consultations between finance ministers), from which it is next to impossible to extract a fund of transferable experiences related to economic growth.

With respect to the whole book, the reviewer feels that the message con-

veyed by the Historical Record (Part I) is clear, straightforward, and meaningful. In other parts (II and III) the book is still useful since it aptly conveys the feelings of frustration on the part of economists who attempted to analyze the birth of the new patterns for ICM after the second World War, without the benefit of retrospective detachment.

JOHN C. H. FEI

*Cornell University*

*Trade Liberalization Among Industrial Countries.* By BELA BALASSA. New York: McGraw Hill, 1967. Pp. xvi, 252. $7.96.

This book is one of eight of the Atlantic Policy Studies series sponsored by the Council on Foreign Relations. Other volumes deal with international financial cooperation, the Atlantic Alliance, aid policies, western policies toward the developing countries, Atlantic trade and agriculture, and U.S. policies toward Eastern Europe. In addition the series includes a set of papers by eight economists from six industrial countries which stresses their countries' interest in trade liberalization; these papers are published in *Studies in Trade Liberalization*, with Balassa editor.

Balassa's book follows the tradition of Council studies; it is comprehensive, articulate, concise, and judicious. Unlike many Council volumes on economic issues, substantial quantitative data are used in an attempt to assess the economic impact of several types of trade arrangements, these alternatives are in Atlantic Free Trade Area, multilateral tariff negotiations under the most-favored-nation rules, a free trade area of industrial countries which excludes the European Economic Community, and an enhanced European Economic Community embracing all of Europe. These alternatives are not exclusive as this may suggest, for new regional groups, once established, might then engage in multilateral tariff negotiations on an MFN basis.

The book was completed in the spring of 1966, nearly a year before an agreement was reached in the Kennedy Round. Balassa's search for alternatives reflects the then-current belief that the negotiations would not succeed. If the agreement is implemented, the post-Kennedy Round tariff structures will be substantially lower, and not by an equal percentage amount, and the potential gains from further reductions on a general or preferential basis substantially smaller.

This book involves empirical applications of customs union theory, together with an assessment of the political implications of some of the choices. Balassa first considers the economic background and the political considerations in the liberalization of trade in the industrial countries. Protectionism in the industrial countries is evaluated, and duties are measured in accordance with the effective tariff concept. One chapter deals with the static effects of trade liberalization, another with the dynamic effects, a third with the impact of trade liberalization on direct foreign investment. Appendices deal with the measurement of effective duties, the measurement of the static effects of trade liberalization, and the policy implications of trade liberalization.

The traditional free trade argument is that any country can enhance

domestic economic welfare by a unilateral reduction and perhaps elimination of its import barriers. The counter-argument is that such actions also would increase the economic welfare abroad, and that domestic economic welfare would be increased even more if the promise to reduce domestic import barriers is used to induce a reciprocal reduction in foreign import barriers. Traditionally, postwar negotiations have been conducted on the basis of reciprocity; each of the major parties to the negotiations has agreed to cut its import barriers by an equivalent amount. Reciprocity has meant equal percentage reductions in duties on the same absolute volume of imports by principal suppliers (other suppliers have benefited, in that they may get the advantage of reduced foreign tariffs without having to reduce their import barriers in exchange). This measurement may facilitate negotiations but it tends to be mechanical; for it is not clear that equal percentage cuts provide the most appropriate way to increase economic welfare by equivalent amounts. Moreover the political benefits from reciprocal reductions may be minimal, and a resultant largely of the altered nature of the community, rather than of a net credit balance in the exchange of concessions.

The assessment of the political implications of alternative U.S. trade policies should reflect cost-benefit analysis; the United States should pursue that trade policy which yields the greatest combined political and economic benefits. Balassa concludes that European integration is desirable, that Canada and the United States should form a free trade area. Then these trading areas, together with Japan, should engage in mutual reduction of duties. In appraising Balassa, the relevant questions are whether the conceptualization of the issue is appropriate, whether the major variables have been included, and whether the economic calculus is sufficiently correct so that there is confidence in the ranking of alternatives.

If trade negotiations are viewed as a vehicle for achievement of a foreign policy objective, some quantitative ranking of the political payoffs attached to different types of trade arrangements is desirable. Then it would be possible to estimate the trade-off between gains in economic welfare and the achievement of political objectives, and to optimize between them. Balassa estimates the gains in economic welfare from a generalized elimination of tariffs, but not for the other trade arrangements. Moreover he focuses on welfare gains from trade in industrial products only, perhaps because the series has a separate volume on trade and agriculture. The costs of adjustments to a reduction in import barriers are ignored, as is the cost of negotiations. Balassa does not estimate foregone gains in economic welfare because a European Trading Bloc and an American Trading Bloc are deemed politically preferable to a non-bloc arrangement. Clearly it is difficult to estimate the gain to U.S. political objectives from integrated Western Europe, and it was not requisite that Balassa supply such data. But without this estimate, acceptance of his preferred alternative is difficult.

In selecting among the choices offered by Balassa, more data and information are needed than he supplies. Clearly not all of the elements in the choice, especially the political aspects, can be quantified. Balassa, in attempting a

quantitative economic utilitarianism for the nation-state, has pointed in a useful direction for policy oriented research.

ROBERT Z. ALIBER

*University of Chicago*

*Les problèmes monétaires internationaux.* By ROBERT MOSSÉ. Paris: Payot. Pp. 318. F19.

The main merit of this book is to integrate in a most lucid fashion economic theory, empirical information, and policy analysis relevant to the topical issue of international monetary reform.

Three introductory chapters summarize the classical theory of international adjustment and apply it to current estimates of the French and American balances of payments. The following four chapters outline the major political and institutional choices open to national leaders in this respect. The last two chapters review the functioning of the Bretton Woods system and the reforms that have been proposed to correct the deficiencies of the gold-exchange standard.

The author strongly attacks the conservative orthodoxy which still inspires at times some of his colleagues and of national leaders, in France and elsewhere. I very much agree with his criticism of policies derived from a narrow consideration of arbitrarily defined "overall balance" deficits, and with his integration of such information into a broader framework of national accounts. He gives priority to economic growth over balance of payments equilibrium, and welcomes foreign "deficits" compensated by an expansion of long-term assets and investments abroad, or even at home. In doing so, however, he tends to understate (1) the liquidity problem which may, willy-nilly, put an end to a country's persistent reserve losses, and (2) the international incompatibility of such policies if simultaneously pursued by many countries.

Mr. Mossé tries to elude some of these problems through more "elastic" policies regarding exchange rates (i.e., the adoption of flexible rates) and exchange control. This might help solve the first, but not the second, of the two difficulties raised above, and would not, in any case, guarantee indefinite access to the foreign borrowings needed to finance continuing deficits.

The author's arguments and conclusions regarding the future role of gold in the international monetary system and the functioning of the gold-exchange standard and the IMF cover soberly, lucidly, and judiciously a broad area less fully and fairly explored by the proponents of conflicting reform plans. I find him, myself, excessively generous in his judgments concerning the gold-exchange standard and the achievements of the International Monetary Fund. I welcome his arguments for an international demonetization of gold, but wish he had stressed, more than he does, that this may be politically unfeasible— or even disastrous—as long as the only alternative to gold remains the accumulation of so-called key currencies, i.e., in practice the financing of U.S. or U.K. policies on which other countries may not have been consulted and with which they may forcefully disagree. (Am I, however, an unbiased observer on a problem in which I have long been so deeply involved in my writings?)

Space does not permit me to dwell on minor points whose treatment could be improved, such as the summary of purchasing power parity theory (p. 38), the inclusion of *all* unilateral transfers within the balance of payments current account, and the messy presentation of some statistical tables (p. 62, for instance).

In conclusion, this is a lucid and useful introduction to an important and topical aspect of international economies, and an intelligent plea for a broader approach to policy action than is often found in such texts. I particularly welcome the author's plea for progressive, but radical, reforms of the IMF and for the reintegration of Eastern Europe in the international monetary community.

ROBERT TRIFFIN

*Yale University*


*A Primer on International Trade.* By JAN PEN. New York: Random House, 1967. Pp. x, 146. $1.95.

"The dispute between free traders and protectionists is still going on. The advocates of free trade are winning every battle—in the textbooks" (p. 104). Professor Pen did not write a textbook, but he certainly won his battle against short-sighted protectionism in today's world. This is not to say that Pen's little book concentrates on the issue of free trade *versus* protection only; the title of the book is fully justified by its contents. On the other hand, in presenting the fundamentals of international trade theory and policy the author does not fail to stress time and again the advantages of an international division of labor and of an international exchange of goods and services—and very rightly so, in this reviewer's opinion.

Part I deals with the basic principles of international trade theory, i.e., mainly with the theory of comparative costs. Part II is devoted to the balance of payments and the problems of equilibrium in foreign trade and payments; it includes a useful chapter on the essentials of Keynesian analysis regarding balance of payments problems, and it ends with a discussion of the forces that are continually changing the pattern of world trade. Part III discusses autarky and protection, trade expansion, and regional association and integration. Also, a few pages are devoted to trade with centrally planned economies and to the trade problems of developing countries.

Pen is an experienced writer on economic topics, and has a particular talent for explaining problems of modern economics to readers not trained in that profession. He again displays this skill in the book under review. It is almost everywhere admirably clear, and entertaining at the same time. It makes therefore very pleasant reading, and one feels—or this reviewer felt, at least—that Pen must have enjoyed writing it. Is it perhaps due to a desire to maintain the pleasant atmosphere of the book that the grim reality of the structural imbalance of the trade of the poor countries, encompassing two-thirds of mankind, is given so little attention?

As Pen's book is an introductory text, of limited length, on a subject well studied by economists for more than a century, it is not surprising that the

book does not raise theoretically controversial issues. Only a few comments seem necessary. (1) On page 19 the author discusses the objection of an inhabitant of a poor nation to the theory of comparative advantage. "My country has no comparative advantages," this man says, "we are too expensive all along the line." Pen answers that the rate of exchange should be lowered so that "the prospects for exports might become brighter, and it might be easier to find the branches of industry in which the country has a comparative (not an absolute) advantage." This is certainly true, except that vis-à-vis the potential trade partners of this country (the importers mentioned two pages earlier) the comparative advantage should effectively be turned into an absolute advantage if trade is to take place. (2) It is not true that "foreign aid . . . rests disproportionately on American shoulders" (p. 85). See, for example, the OECD's Reviews of *Development Assistance Efforts and Policies* and the various sharing-of-the-aid-burden proposals. (3) The author points out in a note on page 95, that the U.S. tariff on industrial goods is higher than its nominal level indicates, because of the U.S. Selling Price System (which is not mentioned by name). He writes: "The duties that the importer pays are not based upon the price of the comparable domestic product." Obviously the word "not" should be deleted, or the sentence rephrased. (4) There is an inaccuracy on page 127; Singapore was part of Malaysia only till August 1965, and Brunei never was.

Pen's book deserves to be widely read. Undergraduates may benefit greatly from it, primarily because of its clarity but also because of its "programmed" setup ("if you don't understand this point completely, go back to chapter so-and-so"). It may also be recommended to the nonacademic reader, however; one would hope that in particular politicians who have to decide on matters of foreign trade policy would find the time to spend a few hours with this book. The gains that this investment of time could yield to the world at large are quite considerable.

HANS LINNEMANN

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*International Economics and Business: Selected Readings.* Edited by WALTER KRAUSE AND F. JOHN MATHIS. Boston: Houghton Mifflin, 1968. Pp. xiii, 490. $5.25.

This book offers a fresh approach to "international" subject matter: it successfully brings together the substance of traditional international economics and the core materials of the growing field of international business. The unifying theme is that of the presence in the international economy of a dual decision-making authority, emanating from government and business. Government actions (of central concern in international economics) affect the international environment, but so, also, do private actions (upon which attention has centered in international business). Indeed, the two sets of actions are very much interdependent, a fundamental point developed throughout this volume.

The presentation consists of selections drawn from diverse sources, coupled

with original materials. More than 60 major selections are included. The choices reflect imagination and good judgment. The substantive content is enormous, well-balanced, and relevant to the present; skillful excerpting adds to overall solidity. Likewise, the representation of authors is impressive—there are contributions by over 60 authors, providing different points of view as well as the basics on particular topics. The editors have interspersed editorial commentary which effectively relates the selections to one another and provides overall focus to the volume.

The headings to the six major divisions reveal the gist of the story being told. Part One—The International Economy—provides basic background on the international economy: its nature, participants, and performance. Part Two—The United States in The International Economy—examines the international economy from the specific standpoint of the United States. Part Three—International Economic Policy of the United States—surveys the key components of this country's policy toward the international economy. The approach in all these sections emphasizes the side-by-side presence of government and business. With Part Four—United States Business in the International Economy—the role of American business in the international economy is approached directly. And in Part Five—Policy Issues on International Business—attention is given to a number of important problem areas of international business and the government-business association. Finally, Part Six —Prospects for the Future—offers speculation about what is to come; the trends of trade and investment, etc.

The book seems well suited for use in a number of courses, spanning international economics, international business, and economic development. It should appeal especially to instructors of international economics who wish to reinforce other reading with something more on "private sector aspects," to instructors of international business who seek to treat business within the context of the overall international environment, and to instructors of economic development who regard business as deserving of more attention as a lever of developmental promotion. Aside from the classroom, the quality of the selections and the topicality of their orientation should assure the volume of considerable use as a ready reference source for some time.

At the risk of quibbling, this reviewer would have liked the inclusion of a selective bibliography to steer the reader onto further materials. Also, inclusion of two further selections expressly devoted to Japan and Canada, both important trading partners of the United States, might have been helpful. Such omissions detract little, however, from what must be considered a first-rate work. The volume's integrated approach clearly represents a major step forward in the treatment of "international" subject matter.

ROBERT A. FLAMMANG

*Louisiana State University*

## Business Organization; Managerial Economics;
## Marketing; Accounting

*Mathematical Reasoning in Economics and Management Science.* By JOHN
C. G. BOOT. Englewood Cliffs, N.J.: Prentice-Hall, 1967. Pp. xii, 178. $7.95.

This book consists of twelve chapters, of which four are primarily mathe-
matical, three are concerned with decision theory, and the remaining five
with models used in management science and economics. The mathematical
chapters are concerned with characteristic-value problems, difference equa-
tions, probability problems, and Markov chains; the decision theory topics are
on decision criteria, game theory, and strategies, while the remaining chapters
present elementary models in the areas of dynamic programming, inventory
management, input-output, growth, and sensitivity analysis. "The choice of
topics was guided by the fact that one or more of these topics is always ne-
glected in structured courses." This set of twelve chapters itself neglects a
number of topics usually found in courses in management science, notably lin-
ear programming, simulation, and equipment replacement theory. The unusual
nature of the topics covered is that topics in both economics and management
science are included in the same volume whereas most texts are primarily fo-
cussed on one or the other of these areas. A combination of two typical texts
in the two areas would provide a much wider selection. Nevertheless, it is the
author's right to select whatever topics he wishes and Boot's choices are inter-
esting enough. The book's short length precludes a thorough treatment of the
topics considered. In this respect it is not adequate as a text. The reader will
acquire very little skill in model construction. Its function rather is presum-
ably to acquaint readers previously not exposed to literature concerning math-
ematical models and techniques (other than calculus, matrix algebra, and ru-
dimentary probability theory assumed) with an overview of several applica-
tions of these techniques. Very little of the material trains the reader to make
such applications on his own or provides him with a thorough understanding
of the techniques employed. For example, the concept of "discounting" is ex-
plained by a single short postscript (p. 110) and such basic fundamentals as
the fact that maximizing the "internal rate of return" and "discounted cash
flow" do not in general result in the same decisions. "Barring freakish cases
this procedure works, and it is theoretically widely acclaimed" (p. 132). The
probability chapter consists of a highly specialized set of problems and does
not develop any ability on the part of the readers to solve similar problems.
The mathematical motivation is not revealed to the reader. A more detailed
criticism is that an identical economic lot size model is developed two times, in
adjacent chapters! There are arithmetical errors in at least two of the thirty-
five examples.

The book is written in a style that holds the reader's interest. It can be
read usefully and enjoyably as a collection of assorted gadgets. For more than
a dilettante's knowledge, however, a different sort of text must be recom-
mended.

T. M. WHITIN

*Wesleyan University*

## Industrial Organization; Government and Business; Industry Studies

*The Structure of the Defense Market, 1955-1964.* By WILLIAM L. BALDWIN. Durham: Duke University Press, 1967. Pp. viii, 249. $8.00.

Professor Baldwin analyzes the structure of the defense market in a decade of Cold War, characterized by neither escalation nor disarmament. The defense market had virtually completed its adjustment to the end of hostilities in Korea by fiscal year 1955, and the Vietnam buildup did not result in significant demands for U.S. resources until the second half of the fiscal year 1965. The intervening decade, therefore, was a period in which the structure of the market could evolve and respond in a fairly orderly manner to the demands of national defense in a period of rapid technological change, but without rapid changes in the level of such demands.

The author has developed and analyzed a large and extremely comprehensive array of pertinent data on the structure of the military market in the United States. The result is not light reading but the reader interested in this important, but still relatively neglected, area of interaction between government and business will find much that is worthwhile.

The following are among the key findings which this reviewer extracted from the wealth of data and detailed analysis contained in the study:

1. Due to the impact of "space age" technology, the concentration of total defense contracts increased during the years 1955–1964 from World War II and Korean levels. The top 50 firms accounted for 66 per cent of military prime contract awards during the fiscal years 1963–64, compared to 56 per cent during Korea and 58 per cent in World War II (p. 9).

2. Impressions of volatility in the composition of the major defense contractors gained from merely looking at annual exits from the highly publicized list of the top 100 "are grossly exaggerated" (p. 17). Through painstaking research, Baldwin shows that many of the "drop-outs" are due to mergers and the special case of short-term joint ventures by construction companies. In light of the changing composition of defense spending, the relative stability of the major defense firms is considered to be "remarkable."

3. On the basis of personal correspondence with the firms involved and other primary sources, Baldwin develops a picture of the dependence of the major government contractors on defense business. The "typical" large contractor received about half of its sales from military or government business (49 per cent in 1957 and 51 per cent in 1962) (p. 74).

4. Baldwin suggests the possibility that the overall low elasticity of military demand for goods and services can be consistent with very high elasticities of demand for specific items (p. 81). If there are several products capable of performing closely similar functions, relative prices may be important determinants of the quantity of each purchased, even though the buyer is willing to pay almost any price to have that general class of functions performed. He also notes that the McNamara efforts to increase competition at the early development stages have done little to increase demand elasticities at the later and more costly stages of a weapon system.

5. Baldwin attributes the substantial barriers to entry into the defense market more to highly specialized and technologically advanced requirements of the military customer than to government procurement policies themselves (p. 167). However, he does not pay sufficient attention to the entry-discouraging effects of government-owned plant and equipment provided gratuitously to the major long-term contractors. In order to reduce the high degree of stability among defense contractors, Baldwin urges attention to barriers to exit. He considers alternative types of government assistance to defense contractors who attempt to utilize their capabilities in commercial markets. In view of the consistently poor results that these diversification efforts have yielded in the past and the extreme reluctance of the company managements to invest substantial amounts of their own funds in these ventures, this approach would seem to offer little encouragement.

6. An interesting array of profit ratios is developed for the major defense firms. Baldwin appears to conclude that the most important feature of these data is "the increase in rates of return on sales as specialization in the defense market declines" (p. 190). His data also reveal, however, that the rates of return on equity were generally higher for firms with larger percentages of sales in the defense market than they were for those with smaller percentages. This is a point usually overlooked, or at least played down, by many in the defense companies and in the military establishment. When data for companies selling primarily to the military are compared with results for commercially oriented corporations, we find that the lower profit margins on military work are more than offset by the large amounts of government supplied capital. Thus, rates of return on stockholder's investment are substantially higher for the defense contractors.

As Baldwin's findings and conclusions relate to a period of cold war, developments in the military market since the Vietnam buildup have changed some of the patterns. For example, the entrenched position of the large aerospace and electronics companies has been weakened somewhat because military demand has shifted from large bomber and missile systems to conventional war ordnance; the latter is supplied in good measure by medium-size mechanical equipment producers. Although much of the specific data and even findings developed by Baldwin may mainly become of historical interest, perhaps the major long-term value of his work is to demonstrate that the defense market is amenable to the traditional analytical tools of industrial organization and thus to encourage additional work in this area.

MURRAY L. WEIDENBAUM

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*Trends in the World Aluminum Industry.* By STERLING BRUBAKER. Baltimore: Johns Hopkins Press, for Resources For The Future, 1967. Pp. xiv, 260. $6.95.

Mr. Brubaker's study is more specific than the title would indicate: he is aiming at the future locational pattern of aluminum production and primary smelting. After a sketch of past trends and a quick but useful panoramic survey, he considers the future demand for aluminum, with particular reference

to competition from steel, copper, and less close substitutes. This serves to set the stage for a chapter on basic technology, and one on the size structure and competitive practices of the international industry. With the growth of the industry and the number of firms in it, less public benevolence toward cartels, and better awareness of the competition from other metals and secondary aluminum, "the major international firms appear to compete strongly with each other." Nevertheless, this competition is limited by the integration forward, or by construction of primary facilities with government protection, which has about the same effect in foreclosing the custom of fabricators who would otherwise be free to choose among the firms. Government policy toward international trade in ingot aluminum and a restricted range of products is again a mixed picture, but on the whole the downgrading of aluminum as a very scarce armament metal, plus the general tendency to liberalize trade, have both fostered somewhat greater competition. Hence prices are a better indicator today of real social cost.

There follows a very useful chapter, which must have been difficult to write, on the cost structure of the industry and on the prospects of improved technology. The strategic factor is considered to be low-cost electric power, and the writer considers carefully the prospects of lower costs from coal, gas, oil, and above all nuclear power. Here the author has a major problem, which probably could not be solved in a brief space. For every supplying industry, he needs essentially the same kind of inquiry that he has made for aluminum, covering demand, cost, and the degree of competition, in order to be able to guess at what price it will be forthcoming. Where this reviewer would part company would be in his seeking the most reasonable single-valued estimates. Sources of error are so numerous, especially of change in technology or market structure, that substantial error is inevitable, and must be hedged against by indicating the range of variation and the difference it would make for his ultimate conclusions. This indeed is what he did in considering the relation between fuel costs and thermal efficiency (p. 185) and one wishes this had been done throughout. Basing himself on current costs of oil, he concludes that very little new smelting capacity is to be expected outside the United States and Australia. But if real costs of oil are very much lower, and would be available "should national policy permit its entry" this conclusion would have to be substantially modified. Will policy change? He owes us the question, though not the answer. Again, prices quoted for nuclear power stations (footnote, p. 197) are far below current: the price for one thousand megawatt plants is about fifty per cent higher now.

The author expects that future plants will not be located more often in Africa, South America, or South East Asia than they have previously. The underdeveloped countries will be handicapped in the future as in the past by high costs of power and capital while labor costs are of minor importance. One will undoubtedly find some exceptions, but they seem to be few. This supposes that the current climate of noninterference or less interference will continue and that location will be determined largely by comparative costs as in the recent past. The desire on the part of developing countries to claim any economic rent arising through the exploitation of their resources is entirely un-

derstandable. However, it is doubtful that there is much rent to be claimed in the aluminum industry. Bauxite supplies are too plentiful and alumina production "provides little opportunity for economic rent."

Brubaker has had to cut across a wide range of subjects, and has done an exemplary job of analyzing an important commodity. The book deserves an audience not only for its subject but for its method: look to demand, supply, and market structure.

M. A. ADELMAN

*Massachusetts Institute of Technology*

*The Economic Impact of TVA.* Edited by JOHN R. MOORE. Knoxville: The University of Tennessee Press, 1967. Pp. xv, 160. $4.95.

The eight essays in this volume incorporate principally a series of lectures presented in 1964 on the thirtieth anniversary of TVA. One neither expects nor finds much coordination of subject matter. Stefan Robock confesses a professional embarrassment over the lack of a single scholarly work evaluating TVA as a means of social and economic development, and suggests a possible approach. The volume will not leave him or anyone else much better off. None of the authors had space enough to get off the ground, although many comments are not without meaning or interest. Bruce C. Netschert protests against exaggerating the importance of cheap energy in economic development. John Oliver thinks TVA is well worth studying by underdeveloped countries, but as Robock's comment implies, it is not clear what was being accomplished in the one place nor, therefore, whether it promises well or ill for the other. Joseph L. Fisher thinks TVA's most important contribution is the very idea of regional development, with a specialized agency of national government "leading and encouraging numerous public and private agencies within the region to improve the lot of the people living there." Apparently no more satisfied than Robock with the current state of cost-benefit analysis, he is hopeful about recent advances in analytical and statistical techniques. The place of TVA in history is secure; he asks what of its future.

Norman Wengert writes an interesting short political history of TVA, which is discouraging in showing that ideological static about "creeping socialism" is still being taken seriously in recent years. But discussion of costs and benefits of hydroelectric or thermal generation is strikingly absent from the book.

Ronald H. Wolf writes on TVA's connection with the notorious electrical equipment price-fixing cases. The conclusion I would draw from his essay, contrary to his own, is that TVA had virtually nothing to do with the exposure of the conspiracy. It would have been poetic justice if they had, since TVA only began publicizing identical bids as a counter-measure to the attacks made on them for buying foreign electrical equipment. Gilbert Banner tries to make a critical appraisal of TVA and supplies at least a useful introduction to such a study. Finally the board chairman of TVA writes the expected upbeat ending.

M. A. ADELMAN

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## Land Economics; Agricultural Economics;
## Economic Geography; Housing

*Controlling Pollution.* Edited by MARSHALL I. GOLDMAN. Englewood Cliffs,
    N.J.: Prentice-Hall, 1967. Pp. xiii, 175. $4.95; paper, $1.95.
*Economic Costs of Air Pollution.* By RONALD G. RIDKER. New York: Fred-
    erick A. Praeger, 1967. Pp. xii, 214. $13.50.
*The Pesticide Problem: An Economic Approach to Public Policy.* By J. C.
    HEADLEY AND J. N. LEWIS. Baltimore: The Johns Hopkins Press, for Re-
    sources for the Future, 1967. Pp. xvii, 141. $3.50.

The essays in *Controlling Pollution* are grouped into four major parts plus
an introductory article by Marshall Goldman and a statement on pollution by
the Council of Economic Advisers. Part One titled "The Nature of the Prob-
lem" contains three essays. In the first, Gladwin Hill indicates why he doesn't
like water pollution; and, in the second, C. W. Griffin, Jr., complains about
air pollution. The third essay, written by Goldman and Robert Shoop, is an
interesting summary of the technology of measuring and treating various
types of pollution. Articles worth mentioning in Part Two, entitled "Economic
Analysis," are by Milton Friedman on the role of government; Edwin Mills
on the use of economic incentives in controlling pollution; and J. E. Hazelton
on pollution controls in the New England area. Part Three of the book con-
tains five papers, each describing actions taken to "solve" a particular pollu-
tion problem. The best is Allen Kneese's description of water control in the
Ruhr area. Part Four of the book contains three articles that appeared in So-
viet newspapers and a section of a speech by Mikhail Sholokov. Each is a plea
for greater pollution control within the Soviet Union.

The purpose of many of the articles appears to be that of motivating the
reader to "do something" about pollution. With the exception of Kneese's ar-
ticle none of the papers was intended for publication in a scholarly journal.
Consequently the book will probably be of little interest to the professional
economist. Nevertheless, some of the papers provide interesting reading pri-
marily because of the examples and observations on institutional matters, and
because some of the many broad generalizations seem worthy of careful inves-
tigation.

The objectives of Headley and Lewis, in *The Pesticide Problem: An Eco-
nomic Approach to Public Policy,* are "to develop a clearer understanding of
the issues for public policy in the pesticide problem, to suggest an approach to
policy formulation based on economic analysis, to review what is known about
the technical relationships between pesticides and environmental quality and
to propose research approaches that will provide guidance for future pest con-
trol policy."

The first of the eight chapters contains a discussion of the various types of
pesticides as well as the aggregate use of materials and the various areas
where they are used. The first few pages of the second chapter say that mar-
ginal cost should equal marginal benefit. The remainder of the chapter is a
summary of methods for controlling pests other than by the use of chemicals.

The third chapter contains a short description of the methods of cost-benefit analysis and some rather oversimplified consumer surplus arguments on the benefits from the introduction of pesticides.

The fourth chapter pertains to the impact of pesticides on agricultural productivity and organization. The data, drawn from U.S. Senate Hearings, indicate the possible magnitude of increased output of various crops due to the introduction of insecticides and herbicides. They also briefly summarize the general directions of research pertaining to the technical relationship between pesticide residues and soil properties.

Chapters 5 and 6 are devoted to the effects of pesticides on human health and the evaluation of those effects. The effects of pesticides on humans are classified as those due to the reduction of diseases and those due to toxic effects of the chemicals themselves. Evidently, pesticides present the greatest problem as an occupational hazard. But here, as in the case with accidental poisoning and the existence of toxic residues in foods, it appears that the problem is not necessarily one of the lack of knowledge about technical relationships but rather carelessness in the use of these chemicals and disregard for instructions. The authors really made no attempt (ten pages) to place a value on the effects or even to outline the literature on the subject.

The authors have great difficulty indicating an economic approach to the relationship between pesticide use and the effects on fish and wildlife. Little is known about the direct effects of different pesticides on different animals and the food-chain relationships are highly complex. Furthermore, even if the technical relationships were understood, there are problems in integrating them into welfare economics and cost-benefit analysis.

Headley and Lewis succeeded in doing what they intended to do. Even though there are many problems with their applications of welfare economics and most of their "conclusions" are really at the conjecture stage, they have done a good job on much of the preliminary research necessary for economic studies relating to pesticides.

Ridker's book, *Economic Costs of Air Pollution,* is a useful addition to both the cost-benefit literature and the air pollution literature. The book is very easy to read since Ridker has carefully outlined his procedures and results. Surprisingly enough, the best parts of the study are not numbers or functions representing the cost of air pollution, but the systematic failures of reasonable procedures and imaginative tests to yield some measure of the cost of air pollution. Perhaps this work will serve to decrease the propaganda and oversimplification which shroud the topic.

Ridker uses three different approaches to the measurement of air pollution costs. The first is to determine the functional relationships between a measure of "pollution" (say annual geometric mean sulfation rate) and physical damage (say metal corrosion) to some object. A value is then placed on the physical damage. This approach is used to measure the cost of disease associated with air pollution (Ch. 3). In this case, the "damage" would be in terms of premature death, premature burial, treatment, and absenteeism. Income foregone and value of treatment are the associated costs. Ridker first attempts to measure the cost of six diseases (cancer of the respiratory system, pneumonia,

etc.) and then to determine the number of cases due to pollution. He has trouble obtaining data on the cost of diseases but the real trouble is relating them to pollution. Using 56 metropolitan areas, several different measures of pollution, and several demographic variables, he failed to find a relationship between pollution and mortality rates. Absentee rates due to illness for a St. Louis firm were not explained by the pollution levels at the employees' places of residence. A study of absenteeism at St. Louis elementary schools gave the same results. The only measure that could be found that might implicate air pollution was the difference between urban and rural death rates.

The second strategy used to measure the cost of air pollution is to measure the costs incurred by individuals in their attempts to reduce the effects of air pollution. With soiling and materials damage in mind, Ridker attempts to get the cost by comparing between cities the differences in laundry and dry cleaning receipts, cleaning costs of businesses, and receipts of a contract cleaning firm. Within a particular city with pollution levels differing between areas, he compares sales of cleaning supplies and business maintenance procedures for several different firms. Finally, a questionnaire was designed to determine differences in household cleaning activities. The results were uniformly negative. The same approach is used again (Ch. 5) in a particularly interesting attempt to measure the cost of an isolated pollution episode by the use of questionnaires.

The third strategy used to measure costs is what Ridker calls "market effects" which in principle would be the measurement of consumers' plus producers' surpluses in affected markets. Since air pollution is specific to locations, and locations are fixed in supply, Ridker attempts to measure the cost of pollution by measuring differences in property values. There can be problems in connecting this measure of "cost" to the measures of "cost" needed to solve the externality problem. Assuming individuals in the absence of pollution are indifferent between locations, this index will give the correct results. But, slight modifications in this assumption could cause the index either to overestimate or to underestimate the proper "costs." In any case, Ridker (using cross-section data in Chapter 6) does a pretty good job of establishing a functional relationship between a pollution index and property values. An imaginative time series study in Chapter 7 yields less satisfactory results.

In both Headley and Lewis, and Ridker, there is a major preoccupation with the idea of "internalizing costs" as opposed to the "exploitation of gains from exchange." This causes a little trouble in two different ways. The first problem is that both studies proceed on the presumption that there exists a "social cost" *function,* say $S(x)$, that needs to be added to the "private cost" function and thus "internalized" into the firm's decision process. The trouble is that except in special cases, such as separable cost functions, there are actually joint costs attended by the problems of allocating them. The magnitude of external costs depends not only on the activities of the pollutor but also on the activities of the receptor. The only relevant number is marginal external cost *at the optimum.*

The best example is found in Ridker's second method of measuring pollution costs. Suppose the production function for firm 1 is given by $X_1 = f^1 (Y_1, D)$

where $X_1$ is output, $Y_1$ is a factor, and $D = D(Y_2, X_2)$ is a damaging element, say corrosion, which depends upon $Y_2$, the frequency of painting, and $X_2$ the output of firm 2. Let $Y_2^* = h(X_2)$ be firm 1's profit maximizing level of $Y_2$ for each $X_2$ and assume $h(0) = 0$. Ridker's procedure would establish the social cost of $X_2$ to be $S(X_2) = P_{Y_2} h(X_2)$. But if $S(X_2)$ were made "internal" to firm 2's decisions the result would be, in general, nonoptimal.

The second problem is that this view attracts attention to the problem of *measuring* costs to the exclusion of other considerations. Since Headley and Lewis are interested in formulating an economic *approach* to pesticide problems perhaps they could have at least given some attention to property rights, liabilities and court proceedings and other exchange mechanisms. Furthermore, even if the costs of pollution were calculated and an optimum achieved in a manner envisioned by Headley and Lewis, and Ridker, there would still be a pollution problem. Unless the receptor of pollution pays for reduced pollution (either by payment or bribe foregone) it is still in his interest to encourage a reduction in pollution levels.

CHARLES R. PLOTT

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*The Theory of Peasant Economy.* By A. V. CHAYANOV. Edited by Daniel Thorner, Basile Kerblay and R. E. F. Smith for The American Economic Association Translation Series. Homewood, Ill.: Richard D. Irwin, 1966. Pp. lxxv, 317. $8.00.

This is an English translation of two of Chayanov's works: the long *Peasant Farm Organization (Organizatsiya krest'yanskogo khozyaisvta)*, originally published in Moscow in 1925, and the brief "On the Theory of Non-Capitalist Economic Systems" ("Zur Frage einer Theorie der nichtkapitalistischen Wirtschaftssysteme") which appeared in the *Archiv für Sozialwissenschaft und Sozialpolitik* in 1924. In addition, the editors contributed two essays on Chayanov's life and works, and a bibliography. The latter includes a list of libraries where his works can be found and even the respective call numbers. The editors have certainly performed their formal duties.

We are told in the Preface that "Probably the most sophisticated and best documented studies of the theory and problems of peasant economy in the half-century from 1880 to 1930 were written by Russians," and that Chayanov's *Peasant Farm Organization* appears as "The masterpiece of this theoretical literature . . ." (p. v). Since economic development is a popular subject these days, a real and a novel (for a Western reader) insight into peasant problems should be of the greatest interest.

The book abounds in statistical tables and observations on the economy of Russian peasants; I shall comment on these below. Both Chayanov and his editors, however, regarded his theory as the most significant part of his work. Indeed, Chayanov compared his contribution with Lobachevsky's non-Euclidian geometry (p. 226).

Chayanov constructed his theory because of the supposed failure of traditional theory to explain certain aspects of peasant behavior, such as variations in the intensity of land cultivation, willingness to pay rent or to buy land at

prices higher than its net or capitalized income, to borrow money at very high rates of interest, etc.; the peasant was able to survive a fall in agricultural prices which was ruinous to a capitalist farmer; as a matter of fact, the peasant worked ever harder. There were many other peculiarities in peasant behavior as well.

The traditional theory was inapplicable to the peasants because it was solely concerned with capitalist enterprises which hired workers and maximized profits. A peasant family farm, on the other hand, employed its members' labor; it paid no wages, no rent for its own land, and no interest on its own capital; hence it had no profit to maximize:

> The economic theory of modern capitalist society is a complicated system of economic categories inseparably connected with one another—price, capital, wages, interest, rent, which determine one another and are functionally interdependent. If one brick drops out of this system, the whole building collapses. In the absence of any one of these economic categories, all the others lose their specific character and conceptual content, and cannot even be defined quantitatively (pp. 3–4).

One could remind Chayanov that, strictly speaking, a capitalist maximizes not his profit but his utility: by sitting up nights and devising new schemes he might raise his profit. But let us not quibble about details, and ask instead the basic question: what does the peasant maximize? It turns out that a peasant family, being both a production and a consumption unit, maximizes its utility by equating its marginal disutility ("drudgery," in the English translation) of labor with its marginal utility of income. It comes as a surprise to a Western reader that the behavior of Russian peasants remains unexplained by the traditional economic theory *because* the peasants behave exactly as the theory prescribes!

Two facts about Russian peasants are relevant here: first, in large areas of central and southern European Russia the land/labor ratio on peasant farms was generally low; second, land, labor and capital were distributed among peasant households in a nonoptimal manner. Some had particularly little land relative to their labor power; others had much more. The combination of these two facts goes far to explain most of the peculiarities of peasant behavior observed by Chayanov (and others). A peasant mutual rental agency for the hire of labor, land, and capital would have eliminated many of these peculiarities, but Chayanov specifically excluded the hiring of labor because less than ten per cent of households engaged in it.

Basic to the peasant's behavior is the presence or absence of nonagricultural opportunities for his labor. If they are absent, he has to continue cultivating his crops almost irrespective of the terms of trade, and he may be willing to pay high rents or prices for additional land. If other opportunities are present and if they are good, he'll behave more and more like a capitalist farmer. Chayanov had many interesting things to say about peasant crafts and trades, but he failed to incorporate the concept of opportunity cost into his theory. At times his reasoning was a bit strange; thus in showing how a fall in agricultural prices ruins a capitalist farmer (but not a peasant), he assumed a constant wage (pp. 88–89). And when he came to one of the most

important questions in the book—do Russian peasants really have negatively sloping supply curves of labor—his proof consisted of two tiny tables (one from Switzerland, of all places, and the other from a Russian province), and a number of theoretical diagrams which happen to be wrong (pp. 80–84).

I would say that Chayanov's main talent lay not in creating new economic theories, but in observing Russian peasants. This he did with a keen eye and much common sense. For instance, his treatment of the peasant family as a dynamic institution which changes its size and structure over time, is excellent; these changes seem to accout for a good part of the differences in income and wealth among peasants, rather than the process of social ·differentiation stressed by Lenin. There are also useful suggestions regarding the future development of Russian peasant agriculture (he did not anticipate the forced collectivization soon to come): he advocated not a horizontal integration (merger) of peasant farms but a vertical one, that is, the gradual transfer of more and more peasant activities to cooperatives. The reader will also find interesting materials about the disposition of peasants' incomes; comments about the negative correlation between food prices and wages in Russia, and many others.

The book contains much statistical data, but unfortunately they are presented very sloppily. Many tables have no titles (though these can be usually deduced from the text); more important—most of them have no dates, and it is not clear what period they refer to. Figures for several areas are presented without any indication whether these areas are typical, and if so, of what part of the country and when. Differences in the variables are regarded as being significant without any statistical tests. And so are simple correlation coefficients of .61, .41 and even of .24 (pp. 64, 105)—the most sophisticated statistical technique used in the book. Chayanov either could not use multiple regression analysis (which his data often beg for) or chose not to. And the book is full of repetitions.

Perhaps the most important service performed by this translation is to remind us about the existence of vast quantities of statistical data about Russian prerevolutionary peasants, data collected with much labor (and love) by *zemstvo* statisticians and waiting to be studied by properly trained investigators.

EVSEY D. DOMAR

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*The Columbia River Treaty: The Economics of an International River Basin Development.* By JOHN V. KRUTILLA. Baltimore: The Johns Hopkins Press, for Resources for the Future, 1967. Pp. xv, 211. $7.50.

John Krutilla has added another to his long list of contributions to the literature on public development and management of natural resources. While the detailed technical discussion will be of absorbing interest only to the true water buff, Krutilla also provides a remarkably lucid case study of the economics of international river basin development. In the process, he has demonstrated, with sobering effect, that the book had to be written as an exercise in political economy.

Part I sets forth the two basic economic questions to be resolved as Canadian and American negotiators set out to translate fifteen years of discussion into action. First, it was necessary to identify the elements of the most efficient system for development of the upper Columbia. Given this system for maximizing the joint gains for mutual sharing, it was essential that the participating nations conduct a similarly thorough analysis of all alternative systems based on the domestic resources available to each. The difference between the sum of the individually achieved net benefits and those from the optimal joint system provides a measure of the total potential gains, and defines a bargaining range within which both parties could realize positions superior to those that could be achieved by independent action.

Part II indicates how these basically sound principles were altered in filtering through the political constraints that prevailed in each country. On the Canadian side the initial unwillingness to accept American financing of projects to be built in Canada or to export power surplus to immediate Canadian needs, and the complex relations between the Province of British Columbia and the federal government had to be considered. On the American side, the usual alliance between the Corps of Engineers, which wanted to build the Libby project in Montana, and the local interests which would benefit thereby, dictated the construction of that project regardless of efficiency considerations. In addition, the so-called "Partnership Policy" had resulted in virtual withdrawal of the federal government from major hydroelectric projects in the western United States from 1953 to 1961. The resulting hiatus left the United States seriously deficient in the storage capacity required for flood control and to firm up power production on the Columbia during seasonal periods of reduced flow.

The result of the filtering process was a set of principles, developed by an International Joint Committee to guide the negotiators, which juggled basic efficiency criteria just enough to mean all things to all men. It is hardly surprising, therefore, that analysis of the negotiations and an economic evaluation of the resulting treaty project system in Part III lead Krutilla to the conclusion that it fell far short of realizing its full potential. The projects chosen were not optimal from the standpoint of the river system as a whole. The procedures adopted for division of benefits committed the United States to a program that is almost certainly more costly than a properly designed system based entirely on domestic projects. The failure to take advantage of new alternatives that opened up between the initial agreements of 1961 and the final settlement in 1964—in particular, the possibility of interties between the Columbia River and Peace River systems, and between the Northwest and Southwest power systems—cost both countries heavily in further economies foregone.

In short, by the time the sound economic principles outlined by Krutilla had run the gauntlet of Canadian and American politics, the hostages to fortune and dogmatic procedures of the Corps of Engineers, and the inevitable limitations of intercommunication among economists, engineers, and negotiators, it is hardly surprising that they emerged a little tattered. Even under Krutilla's properly conservative procedure of reviewing alternatives only in

terms of the same information available to the negotiators at each stage, it is apparent that neither system efficiency nor the relative position of the United States fared as well as could be reasonably expected. Whether an optimal domestic system would have fared any better in the rough and tumble of American water politics is, of course, open to further question. British Columbia, on the other hand, appears to have realized major economic gains, due at least in part to a significantly tighter link between technical evaluation and negotiating strategy on the Canadian team.

It is easy to relapse into cynicism and to argue that the constrast between Krutilla's thoroughly competent development of the economic approach to the problem and the end product of the Treaty negotiations simply indicates the futility of attacking on an economic front problems as inherently political as those involved in international river development schemes.

But a more useful assessment of the value of Krutilla's book must run in terms of its utility as a guide to the future, and here it surely deserves high marks. Had both sets of negotiators operated on the basis of the economic analysis of alternatives developed in Part I, a more efficient initial selection of projects and recognition of the need for long term flexibility in a system as intricate as the Columbia Basin water complex might well have been expected.

Moreover, a more thorough analysis of the elements of an optimal system and of the appropriate comparison between the optimal joint system and the best of the domestic alternatives would have permitted a little more "economy" and a little less "polity" in the mix.

JAMES A. CRUTCHFIELD

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*The Economic Problems of Housing—Proceedings of a Conference held by the International Economic Association, Oxfordshire, England, April, 1965.* Edited by ADELA ADAM NEVITT. New York: MacMillan, 1967. Pp. xxvi, 328. $10.00.

Students of international housing policy will find much of interest in the proceedings of a conference on the Economic Problems of Housing sponsored by the International Economic Association in April, 1965. Twenty-six authors and participants, from 13 different nations, shared in the presentation and discussion of the 19 papers included in this volume. The papers, supplemented by an introduction by Sherman J. Maisel and by a skillfully prepared "Summary Record of the Debate," by the editor, present a valuable current overview of housing problems and policies in Eastern European countries in comparison with Western European countries and with those of Israel, the United States, and Africa.

The papers describing the economic problems of housing in Russia, Yugoslavia, Czechoslovakia, and Poland portray current housing problems as "most difficult," "burning," and "acute." They hold to the general philosophy that the housing problem is a part of the general problem of "social development," which "includes all services from dwellings to sports which cannot be organized individually and the characteristic of which is the collective use of funds and services" (p. 189). Policies in these nations are described as eliminating

the profit motive and requiring large-scale direct state intervention, with cooperative housing viewed as an intermediary form (p. 159). However, the descriptions of the gradual modification of systems of rent control and housing rationing in the socialist nations discussed in this volume clearly reflects the current efforts in these nations to introduce the market-pricing mechanism as a system of resource allocation.

The problems of maintaining an efficient "mixed" (controlled and free) housing market are boldly illustrated in the papers descriptive of the post-World War II performance of the housing sector in the Scandinavian countries. The long-term economic effects of government control of rents and of large-scale direct State intervention in ownership and management of rental housing are examined critically in two papers on Swedish housing and in three directed to examination of historical and other aspects of Danish housing policies. The substance of the "debate" on these and other papers by Muth, Gillies and Netzer, addressed to housing policies of the United States, would seem to eliminate the last national bastions of defense for rent controls as a feature of government housing policies *on economic grounds*. Nevitt summarizes the "Record of the Debate" on rent controls and nonmarket intervention by saying: "Mr. Stahl's model and analysis (of the Swedish housing market) supports, as do several other papers submitted to this conference, the general proposition that rents set without reference to any system of prices are not usually efficient and the houses are not allocated in a way which produces a consistent redistribution of real income" (pp. 271-72).

This outcome of economic and empirical analysis, generally accepted in the literature of the United States and of most Western nations for almost two decades, is particularly significant because it is written about and supported by data for Sweden and Denmark, bulwarks of nonprice rationing methods in the housing fields. Based on the author's personal experience, the political economists writing in the field of housing policy in these Scandinavian countries in the mid-1950s would have viewed the Conference proposition enunciated by the editor of these papers as social heresy and political, if not, professional suicide.

The rationale for the continuance of rent control and large-scale direct State intervention in housing in the United Kingdom is presented by Cullingworth's paper on "Housing and the State," although the author carefully avoids any reference to the economic justification for these policies or to the basic economic reasons for England's chronic housing problem.

Nevitt, in the "Summary Record of the Debate," suggests that the apparent ideological differences between those who defend rent controls and concomitant large-scale State intervention in the housing field, may result from a confusion in two fundamental objectives: (1) resource allocation; (2) income distribution. The editor and other participants argue effectively that rent control and housing policies generally are inefficient methods of achieving goals of redistribution of income and that the most efficient allocation of resources will be achieved through price determination in a market system (p. 272).

The participant from Russia, Nazarevsky, concludes his paper on "Economic Problems of Housing in the U.S.S.R." with the statement that "the

USSR has eliminated the serious housing shortage and within the next few years will enable the housing problem of the country to be solved completely." In addition to his forecast of an almost stupendous rise in Russian housing production from an annual level of 82.5 million square meters in 1960 to a predicted annual level of 400 million square meters in the "second decade," the author predicts that the resultant elimination of the housing shortage will "lead in time to a rent free tenancy" (pp. 239-40). How, the inquiring economist might ask, can one achieve the elimination of any shortage for any scarce good if it is to be a "free good"? Pjanic's paper on housing in Yugoslavia concludes much less hopefully and, in the eyes of this reviewer, more realistically, that "no lasting solution of the housing problem in socialism exists. Just as there does not exist an absolute need or definite aim, there is also no absolute housing need" (p. 199).

No better evidence of the value of this and of similar international economic conferences could be cited than is afforded by these contrasting statements from economists in neighboring socialistic countries.

PAUL F. WENDT

*Berkeley, California*

## Labor Economics

*Presidential Seizure in Labor Disputes.* By JOHN L. BLACKMAN, JR. Cambridge, Mass.: Harvard University Press, 1967. Pp. xvi, 351. $10.00.

For the most part this country has regarded labor-management disputes, with losses and inconveniences to third parties as well as to the contending parties, as part of the price to be paid for private determination of the conditions of employment in organized industries. The government's role is normally that of an umpire and mediator, alert to bar unfair labor practices by either party while seeking to bring them to a mutually satisfactory agreement. At certain times, however, notably during war but also when national emergencies are created in times of peace, government becomes more directly involved in efforts to maintain production while enforcing national policies of industrial relations or price stability as enunciated by the President, by Congress, or by labor boards. One of the coercive measures employed by the government toward this end has been the seizure and temporary operation of the affected facilities.

The policies followed in seizure cases by our presidents, from Lincoln to Truman, are subjected to painstaking review and careful analysis in this well-documented study by Professor Blackman, who has assembled the facts about each of the 71 cases in our experience. Seizures have occurred in time of peace as well as during wars and in periods of reconversion. Sixty of the seizures followed enabling legislation, whereas the others relied on presidential powers independent of such Congressional action. The 71 seizures are listed chronologically in an appendix, with the date of seizure and of return, the name of the seizing and operating agency, the authority for seizure, and the reason for the seizure given for each. Methods of overcoming labor or management resis-

tance, and problems of keeping production going, of enforcing the President's labor decisions, and of settling the disputes, are treated in detail. The effectiveness of seizure is compared with other types of coercion at the disposal of the President, and used by him in other cases of resistance by unions or managements to national labor policy in emergency situations.

Throughout the book Blackman examines coercive measures at the disposal of the government from two points of view: their effectiveness in getting resumption of essential production, and the standards of public policy that are applied. In his view it is as important to treat labor and management fairly and to reconcile their interests with the public interest in wage-price stability as to choose wisely among such coercive devices at the disposal of the government as injunctions, compulsory arbitration, and seizure.

The effectiveness of seizure, Blackman argues, depends upon the President's ability to change or prevent change in the terms of employment during the period of government control, upon his power to determine when the property should be returned to private control, and upon his right to seek a court injunction against strikes, lockouts, or other forms of resistance to his operation of seized property. Because any coercive technique that is used affects the outcome of the dispute in some way, Blackman advocates conscious guidance by the President in the use of controls, to avoid unpredictable consequences or a bias that favors the same side in every case. To avoid obstruction such as that by Sewell Avery in World War II, he suggests that a wartime labor program should be embodied in legislation applicable to all major industries. He notes that cases of management noncompliance were the more difficult to settle, and that a number of legal issues remain undecided, such as whether the employees in a seized facility are federal or private employees.

In this volume Blackman has made an important contribution to our knowledge of the seizure device. In an area where controversy is readily aroused and where opinions are apt to be strongly held, he has shown that careful assemblage of facts and dispassionate analysis can aid understanding and contribute to the formulation of sound public policy.

JOEL SEIDMAN

*University of Chicago*

*The Economics of Age.* By MICHAEL J. BRENNAN, PHILIP TAFT, AND MARK B. SCHUPACK. New York: W. W. Norton & Co., 1967. Pp. ix, 246. $7.50.

The economics of aging has been a relatively neglected field of research for economists. Indeed, those relatively few economists who have participated in such research have typically found that their findings attracted little attention in the profession. However, a number of recent developments seem likely to lead to intensified research on age variations in economic behavior. Among these are the growing interest in human capital, the newer theories of consumption, the findings of recent research on labor force participation, and the burgeoning research on poverty.

The chief contribution of the present volume lies in its application of sophisticated theoretical and analytical tools to the study of the problem of de-

clining employment opportunities for older workers. Its methodology represents a significant advance over much of the previous research on this problem and may well stimulate further work along the same lines. But the book is almost entirely concerned with this one aspect of the economics of aging, that is, with the impact of age on the individual in his role as a worker. Such important problems as age variations in the propensity to consume or to save are not considered. Nor do the authors analyze in any detail the impact of changes in the age structure of the population and labor force on the economy. Thus, one is inclined to question the statement in the preface that "no economic study of aging attempted to date is as comprehensive."

Nevertheless, the volume does include an extensive analysis of the impact of age on employment opportunities, devoting major attention to employment by industry, employment by occupation, and the role of age variations in geographic mobility. The analysis of employment by industry is based on the development of labor demand and supply equations, utilizing data from the censuses of population and manufactures for years around 1960. The authors find that economic variables affecting employment and earnings have a significantly different impact on different age groups in the labor force and that there is a "pure age" effect that operates across industries. Among the factors adversely affecting employment opportunities of older males, the most important are supplementary employer costs with more advanced age (primarily pension costs) and an inverse relationship between productivity and age from about age 45 or 50 on. These findings must be regarded as somewhat tentative and in need of further testing, since, as the authors point out, limitations in the availability of statistical data, particularly in relation to age differences in earning rates, present serious difficulties.

The chapters on geographical mobility are notable chiefly for the attention paid to differences in discounted future lifetime earnings resulting from geographical moves as a factor, often neglected in discussions of mobility, accounting for the greater attractiveness of moving to the younger individual. Occupational variations in employment opportunities of aging workers are analyzed chiefly on the basis of occupational survival rates developed from decennial census data for the years from 1900 to 1960. Although the results are of considerable interest, the findings might have been enriched if information on changing patterns of occupational shifts with advancing age, drawn from the extensive body of literature based on labor mobility surveys, had been incorporated in the analysis.

The book concludes with a series of chapters relating to the public policy implications of the findings. The need for cost-benefit analysis in connection with policy choices between programs aimed at re-employment versus improved income maintenance is rightly emphasized. On the whole, however, the authors regard improved income maintenance as the appropriate answer for the 65 and older group, whereas measures aimed at facilitating re-employment are considered desirable for the 45 to 64 age group. Although one may well agree with this view in general, some of the specific policy suggestions for the 45 to 64 age group are questionable, while the discussion of income maintenance for the 65 and older group is superficial. The statement, for example,

that "the federal government is speaking about a guaranteed annual income of 3,000 dollars for all families, including the aged," will come as something of a surprise to those who have been following the research of the Social Security Administration aimed at refining poverty-line criteria for families of various types.

It is particularly in connection with the authors' review of the data and literature relating to the declining labor force participation of elderly men, however, that their interpretation seemed questionable to this reviewer at a number of points. To mention just one of the problems, the growth of retirement benefits is largely dismissed as a factor influencing the increased departure of elderly men from the labor force on the ground that the benefits have not been of sufficient magnitude to exert a major influence. Yet there is growing evidence, in the recent work of Gallaway and others, that the availability of OASDI benefits, however inadequate in relation to living requirements, may act as a positive inducement to retirement for men who are encountering problems of declining earning capacity. This interpretation is supported by the indications, based on Social Security Administration analysis of earning records, that the large numbers of men who have been applying for reduced OASDI benefits at ages 62 to 64 since 1961 are predominantly men with severely impaired earning capacity. In other words, it is not so much the absolute level of retirement benefits, as the relationship of retirement benefits to earning capacity, that appears to be the decisive variable.

MARGARET S. GORDON

*University of California, Berkeley*

*Bargaining for Health: Labor Unions, Health Insurance, and Medical Care.* By RAYMOND MUNTS. Madison: University of Wisconsin Press, 1967. Pp. viii, 310. $7.50.

Health care is now a $50 billion annual business. Private health insurance premiums are approaching $11 billion. Yet the institutional and economic features of this rapidly burgeoning portion of the economy are relatively neglected in American scholarship. Raymond Munts' study undertakes to fill one important segment of the knowledge gap. His book is a carefully constructed and researched history and appraisal of organized labor's recent large role in the financing and organization of medical care in the United States.

The significance of that role is only partially suggested by the fact that well over 75 per cent of all private health insurance premiums are now paid through group employee-benefit plans. As the book makes clear, the character of health insurance is now greatly influenced by collectively bargained labor-management contracts. In turn, health insurance practices substantially affect medical care institutions, the extent and character of their utilization, pricing policies, and organizational arrangements. Labor's involvement, however, extends far beyond insurance. It has, for example, taken increased reponsibility for direct medical services to members and their dependents through clinics, medical centers, and hospitals of their own. These too have influenced the cost and quality of medical care for the whole community.

Employers pay the largest part of the costs for employee health insurance and labor's medical centers, an estimated average of about 75 per cent. This has become an increasingly important, and complex, part of workers' compensation. Employers are alert to their growing stakes in medical care costs and practices and they too are engaged in efforts to influence them.

Medical benefits have not only added to the responsibilities and functions of unions but health bargaining, having brought both parties into the medical market as purchasers rather than in their accustomed role of producers, has given a new dimension to labor-management relations.

The many important ramifications of the book's subject matter are thus apparent. The material is presented in orderly, balanced, and thoughtful fashion. Part I primarily narrates the experiences of the major path-breaking unions, the needle trades, mineworkers, autos, and steel. Part II discusses the larger issues in health bargaining—benefits and costs, administration, financing, bargaining with insurance carriers and the various providers of health services. Part III presents a summation from which generalizations, lessons, and public policy conclusions are drawn.

Munts effectively traces developments from the "age of innocence" of the late 1940s when better health care for more people seemed merely a matter of removing the financial barrier between would-be patients and medical suppliers. The extraordinarily steep and persistent inflation of medical prices during the past 30 years soon made unions aware that they were walking a treadmill, that only a minor portion of the new money was actually purchasing additional services. For the period 1954 to 1962 "it is estimated that about one-fourth of the increase in aggregate hospital payments and two-fifths of the increase in medical payments represent net additional services to individuals that are an improvement in the scope and adequacy of benefits" (p. 98).

Unions learned that this was no ordinary commercial market which they had entered as mass consumers. To meet their objectives they would be obliged to press changes upon health insurance institutions and become aggressively concerned with the supply side of medical care—adequacy of facilities, their effective use, and pricing practices. From such activities they discovered that cost controls were intimately related with quality control. Unions have become increasingly disenchanted with the kinds and quality of service their hard-bargained funds could purchase. They have moved into more sophisticated selectivity and techniques of providing for reasonable quality. They have found that appropriate cost controls are not a threat to quality, as some had feared, but are generally conducive to higher standards of practice. Finally, unions are now recognizing that "the health interests of members are best served in terms of the health resources of the entire community" (p. 238). This advanced stage of development involves what Munts calls a "strategy of community health bargaining." Its success depends upon the intervention of government authority at several key points.

The author's evidence adequately supports his conclusions that, in addition to enlarging access to care, organized labor has been a salutary influence upon the nation's health institutions, in improving the standards of health insurance

protection—especially Blue Cross—by sensitizing its members to the impor-
tance of health care and to the differential quality of services, and sponsoring
various innovations in the delivery of health care. In such activities it has
tended to serve the community as a whole as well as its members. Munts does
frankly face the problems arising out of such programs and the difficulties
that lie ahead in a field which is still in its very early stages of maturation.

In analyzing these developments, the author gives high marks to the
efficiency and quality advantages of prepaid group practice plans such as the
Kaiser Foundation Health Plan on the West Coast and the Health Insurance
Plan of Greater New York; stresses the value of "countervailing power" in
influencing the organization and financing of medical care; and urges the need
for a deliberate program of rationalizing the medical market. He seems to give
support to the recent development of community and area-wide health plan-
ning and controls and implicitly urges that community health bargaining re-
late itself to such larger community programs—although the obstacles to this
broad approach seem to me somewhat understated.

The author's recommendations are in the main moderate and evolutionary,
emphasizing that future actions can only be based on labor's own experience.
Both the data and conclusions are clearly presented in readable style. They
add up to an interesting and significant chapter in the nation's economic and
social history, well deserving the attention and thought of social scientists.

<div style="text-align: right">HERMAN M. SOMERS</div>

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*Industrial Relations and Economic Development.* Edited by ARTHUR M.
    Ross. London: Macmillan; New York: St. Martin's Press, 1966. Pp.
    xxxv, 413. $12.50.

In 1964 the International Institute for Labour Studies of the International
Labour Organisation convened a two-week research conference on industrial
relations and economic development. Experts from five continents discussed
papers prepared for the meetings. This volume includes fourteen of the papers
discussed in Geneva during August and September of 1964. It also provides
an abbreviated version of a general summary and evaluation of the literature
on industrial relations and economic development prepared as a background
report for the conference participants by a team of I.L.O. staff members. The
editor has written an informative introductory chapter. The volume does not
include either the specific comments of the teams of panel discussants assigned
to evaluate each of the conference papers or an edited version of general con-
ference discussion.

This set of collected papers will be of interest to all concerned with the pol-
icy challenges presented by the variety of labor problems encountered in the
course of economic development. It is the latest addition to a family of books
which has stressed comparative analysis of industrial relations systems and of
employment relations and manpower issues in developing countries.

The papers in this volume are grouped in four major sections. Each section
deals with a critical area of policy choice in developing countries: (1) the role

of the state in industrial relations, including the problems of overt conflict and of the relations between unions and political parties; (2) the sources, functions and financing of trade union leadership; (3) the distribution of decision-making power in wage determination and the role of bargaining, legislation or other processes in shaping national incomes policies; (4) the participation of interest groups in formulating national economic plans.

In a sense, each of the latter three items is a subset of the first, but five of the papers deal more explicitly with the role of the state. Charles Gamba, for many years an adviser to policymakers in Singapore on labor relations issues, discusses the problem of developing effective labor policies in a polyethnic society such as Malaysia. Professor S. D. Punekar of the Tata Institute of Social Sciences in Bombay and Professor Subbiah Kannappan each contributed papers on the facets of state intervention in industrial relations in India. These papers together provide an excellent follow-up to the classic volume on industrial relations in India by Charles A. Myers and bring the reader up to date on the dramatic difficulties of reconciling economic development, parliamentary democracy, free, strong and responsible trade unionism, and cultural diversity.

Professor Hisashi Kawada of Keio University has an excellent paper on the business-government co-partnership in Japanese industrial relations and human resource development. Finally, Mr. T. M. Yesufu, Secretary of the Nigerian National Manpower Board, proposes some very pragmatic criteria for the assessment of appropriate governmental functions in industrial relations and resists oversimplified dichotomies in the delineation of "good" or "bad" or "model" industrial relations systems.

Mr. I. A. Ibrahim's paper on the Egyptian labor movement and Professor Frederic Meyers's paper on the relation of party, government and the labor movement in Mexico provide interesting contrasts in the possible relations of union leadership and political parties in developing countries. Meyers makes a particularly interesting case for the possibilities for considerable trade union independence in what is essentially a one-party state. Adolf Sturmthal has the outlines of a theoretical model of the evolution of sources and functions of unions over industrial time which builds on some of his earlier work on the natural history of national trade union movements and of the relative emphasis in these movements given to collective bargaining versus political action.

Elliot Berg makes a strong case against a high wages policy for urban wage earners in his paper on African wage policy, and the B. C. Roberts-L. Greyfié de Bellecombe paper describes the efficacy of collective bargaining in former British and French African countries. Their subsequent book on collective bargaining in African countries (New York, 1967) expands on the material presented in this paper.

In the final section of the book there are some extremely interesting and detailed papers on the machinery and effectiveness of interest group participation in the formulation of national, social and economic plans. R. W. Cox's paper provides a general introduction to this subject. A. Bajt's discussion of income distribution under workers' self-management in Yugoslavia is the first detailed scholarly discussion in English of the Yugoslav approach to income

distribution. Jay Tabb's paper is an intimate account of the Israeli planning process and the role of its interest groups in that process. Finally, S. Wickham has a paper on French planning which emphasizes the significant role of expert officials in the *planification et harmonisation* processes.

One of the most valuable portions of the book is the excellent annotated bibliography (almost 100 pages long) on industrial relations and economic development in general and for specific geographical areas.

The quality of these papers and of the background report is uniformly high and the editor deserves special commendation for an outstanding introductory discussion of the major questions raised at this research conference.

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## Population; Welfare Programs; Consumer Economics

*Population Growth and Land Use.* By COLIN CLARK. New York: St. Martin's Press, 1967. Pp. ix, 406. $14.00.

This is a book about population growth and land use only in the sense that its first chapters are devoted to population growth and the last ones to land use. There are hardly more than a score of pages, scattered throughout the volume, devoted to the relationship between the two. The preface warns the reader that "the student of population growth and its consequences finds himself compelled . . . to assemble information from the diverse fields of . . ." [there follows a list of 13 fields from biology to traffic engineering] and that "this book is only a preliminary attempt to survey the necessary range of material." The contents of the book justify the warning.

It surveys an enormous amount of material and writings on the subjects of fecundity and fertility, mortality, the history of world population, the carrying capacity of the world, the sociology of reproduction, the economic consequences of population increase and density, the location of industry and urban land use. The work starts with a definition of fertility and ends up, abruptly, with a map of land values in Chicago. Each chapter is a review of a subject and of its literature, with little connection between chapters, and no recognizable thread of argument. The range of material is amazing, and as an intellectual exercise accomplished by one person, the performance deserves respect. Any single reviewer cannot hope to judge adequately the discussion of each subject, but much in it is thorough, stimulating, and provocative. However, at times the coverage of the literature seemed spotty, the choice of evidence arbitrary, and there were many irritating inaccuracies.

The first chapter, for instance, attempts to discuss the subject of the reproductive capacity of the human race without ever using the word fecundity which means, in demographic usage, the capacity to bear children, in opposition to fertility, the actual performance. C. Clark attempts to describe reproductive capacity by the word *fecundibility* (instead of fecundability, the usual form; a footnote on page 1 notwithstanding, the French word is *fécondabilité*). Fecundibility refers to the probability of a woman conceiving

during a given menstrual cycle, but the terminology is used in a thoroughly confusing way throughout the chapter. At times, the period of her cycle during which a woman can conceive is called fertile; total fertilities are termed fecundibilities; and "fecundible married life" obviously does not refer to any menstrual cycles at all.

For a book which draws so much on statistical evidence, and contains many words of caution on its use, at times it is curiously unsophisticated. It criticizes—and rightly so—the Indian life tables derived by comparing two censuses; but accepts survival values based on an estimation of the age at death of a small number of Stone and Bronze Age skeletons—not to mention 22 *sinanthropi*. At one point (on p. 159) the author is not willing to accept evidence from early Indian Censuses as telling more than the total population; at another (p. 227) he accepts the ratio of children under 5 years to women aged 15 to 39 in an early census as indicating differential fertility. In a number of cases, very partial evidence is accepted as typical of a period or a continent, as on page 340 where the density of "a typical African village" is given.

The most controversial parts of the book elaborate on two premises: (1) that population growth is the only force powerful enough to make agricultural communities change their methods and become more advanced and productive; and (2) that in industrial communities, the "principal problems created by population growth are not those of poverty, but of exceptionally rapid increase of wealth in certain favoured regions . . ." (Preface). On the first point, there can be little doubt that population growth historically has acted as an agent of technical change in agriculture, although the extent to which population growth was the cause, and not the effect, is another indeterminate problem of causation of the egg-hen type. But the fact that there were civilizations which managed to provide for their growing populations by an agricultural revolution, does not mean that this is a necessary consequence. It may be that those which did not adjust to population growth and ruined the resource base of traditional cultivation, did not survive to tell the story. There are many examples today of areas where density increase is causing the soil to deteriorate because the fallow period is reduced without change of techniques, or where more intensive cultivation is successful only in accommodating more people at no improved standard of living. Certainly, there are nowadays many techniques and policies of agricultural development which should be less hazardous than unbridled population increase.

The evidence put forward on the second point, concerning industrial communities, is even less conclusive. The author invokes mainly the benefits derived from economies of scale, although he admits that there may be limits, within a short period, to the absorptive capacity of the nonagricultural sector of employment. He quotes S. Kuznets to the effect that there is no correlation in historical series between the rate of growth of real national product per head and the rate of population growth. C. Clark shows, however, that larger markets appear to go together with higher productivity. This, in itself, would be more an argument for international trade and a sustained aggregate demand, than for population increase. We are told that the latter tends to encourage savings, but the statistical evidence presented, although based mostly

on developed countries, is hardly decisive (p. 267 ff.). We are not told how the market for industrial goods in underdeveloped countries would be enlarged by the proliferation of subsistence peasants and unemployed slum-dwellers, but the fact that India has raised its rate of saving in the 1950s during a period of accelerating increase of population is given as an indication of the beneficial effect of the latter.

There is an amusing fantasy about the Mesolithic Englishmen meeting to discuss overpopulation, and deciding to take up agriculture rather than limiting their families or migrating to Scotland. Elsewhere, (p. 58) C. Clark explains that if Malthus' contemporaries in Britain had listened, "most of what is now the United States would probably have been Spanish-speaking, and Britain would probably have remained an easy-going eighteenth-century type agrarian society." It would be easy to answer that, without family limitation, Europe would now have over 2 billion inhabitants. The prospects would not be frightening to Clark, since he speculates that the world could provide food for 47 billion people at American standards of nutrition, and for 157 billion at Japanese standards. The computation, based on climatic criteria, attributes the largest productive potential to scarcely populated areas like the Amazonian and Congo forest, or New Guinea and Borneo, which just points to the Utopian character of this reasoning, which takes no account of the actual problems of economic progress and fails to distinguish the possible short-term effects of a moderate growth in industrialized regions from the disadvantages of runaway increase in nations struggling for their development.

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## Related Disciplines

*Politics, Economics, and the Public: Policy Outcomes in the American States.* By THOMAS R. DYE. Chicago: Rand McNally & Company, 1967. Pp. xv, 314. $6.00.

This is an interesting quantitative study by a political scientist of the determinants of outcomes in the five most important areas of state policy-making. His main conclusion is that these determinants are predominantly "economic" in character. This conclusion is reached through correlation analysis of the linkages between indicators of policy outcomes in the 50 American states and their possible economic and/or political determinants. The period to which the study relates is roughly the decade ending with 1965.

The five most important areas of state policy making are said to be education, welfare and health, highways, public regulation (essentially policing), and taxation. Eleven measures indicate the educational situation or outcome in each state; fourteen, six, thirteen, and ten measures, respectively, indicate the welfare, highways, public-regulation, and taxation situations. There are, in short, 54 policy outcome indicators, interstate differences in which are to be accounted for by economic and/or political determinants.

The four "economic" or socioeconomic determinants selected to reflect interstate differences in "economic development" are: percentage of population liv-

ing in urban areas; percentage of work force outside agriculture, fisheries and forestry; median family income in dollars, 1959; and median school year completed by population, age 25 and over. Except for low correlation between education and industrialization each of the four economic determinants is correlated significantly with each other economic determinant.

Four variables are chosen to represent the political system, interstate differences in which might account in part for interstate differences in policy outcomes in education, welfare, highways, taxation, and public regulation. These four are division of two-party control, the level of interparty competition, the level of voter participation, and the degree of malapportionment. The first three are intercorrelated, constituting a syndrome. The author reports that his findings were seldom modified by exclusion of the 11 Southern states.

The author finds that the economic and political determinants together accounted for sometwhat over half of the interstate variation in the indicators of policy outcomes. The political determinants, however, exercised little independent influence. The four economic determinants affected the policy indicators both directly and through the political determinants which are dominated by the economic determinants. The author notes, however, that his model should be modified to allow for the intervening effect of federal policy. His statistical findings are presented in several summary tables. One effect of these findings is to devalue the role of some factors deemed important by political scientists.

While the author devotes considerable attention to the mechanisms that presumably underlie his correlations, more research is indicated. Then one may determine how stable the reported correlations are. One may also get at the large amount of unexplained variance and at conditions underlying the variables and relations studied. The study is indexed and well equipped with tables.

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"PRAGMATIST" (Economic Weekly essayist). Politics of Indian economy. Bombay: Popular Prakashan, 1967. Pp. xiii, 126. Rs 15.

PUEYRREDON, R. H. Publicidad: esa maravillosa locura. Buenos Aires: Ed. Sudamericana, 1967. Pp. 272.

ROMASCO, A. U. The poverty of abundance—Hoover, the nation, the depression. New York and London: Oxford Univ. Press, 1968. Pp. x, 282. Paper, $1.95. First pub. in 1965.

STYCOS, J. M. Human fertility in Latin America—sociological perspectives. Ithaca: Cornell Univ. Press, 1968. Pp. xiii, 318. $11.

VÉLIZ, C., ed. Latin America and the Caribbean—a handbook. New York: Praeger, 1968. Pp. xxiv, 840. $25.

A cartoon history of United States foreign policy since World War I. Ed. by the Editors of the Foreign Policy Assn. New York: Vintage Books, Random House, 1968. Pp. 252. Paper, $2.95. First pub. in 1967.

The Ford Foundation Annual Report—October 1, 1966 to September 30, 1967. New York: Ford Foundation, 1968. Var. pp.

Resources for the Future annual report for the year ending September 30, 1967. Washington, D.C.: Resources for the Future, 1967. Pp. 134.

Social Science Research Council annual report 1966-1967. New York: Soc. Sci. Research Council, [1968]. Pp. 110.

Studies and other publications issued under the auspices of the Economic Commission for Europe, 1947-1966. UN sales no. 67.II.E.4. New York: United Nations, 1967. Pp. 81.

# NOTES

A nominating committee consisting of Joseph J. Spengler, chairman, John M. Letiche, Ruth P. Mack, Robert V. Roosa, W. Phillip Saunders, Jr., and Robert Solo has submitted the following slate of nominees for 1969 officers of the American Economic Association.

*President-Elect:*

Wassily W. Leontief, Harvard University

*Vice-Presidents:*

Irving B. Kravis, University of Pennsylvania
Moses Abramovitz, Stanford University
Abram Bergson, Harvard University
Joe S. Bain, University of California

*Executive Committee*

Harvey S. Perloff, Resources for the Future
Mary Jean Bowman, University of Chicago
Charles L. Schultze, Brookings Institut
Roland N. McKean, University of California, Los Angeles

The annual meeting of the Association will be held in Chicago, Illinois, December 28-30, 1968, with headquarters at the Pick-Congress Hotel.

## AER MANUSCRIPTS

The following manuscripts, exclusive of comments and replies and in addition to those listed in previous issues, have been accepted for publication in subsequent issues of the *American Economic Review:*

D. J. Aigner and S. F. Chu: On Estimating the Industry Production Function.

W. J. Baumol: On the Social Rate of Discount.

F. W. Bell: The Pope and the Price of Fish.

Louis De Alessi: Some Implications of Property Rights Structures for Investment Choice Within the Government.

S. Chakravarty and A. S. Manne: Optimal Growth When the Instantaneous Utility Function Depends upon the Rate of Change in Consumption.

Otto Eckstein and Gary Fromm: The Price Equation.

H. G. Grubel: Internationally Diversified Portfolios.

Josef Hadar and W. R. Russell: Rules for Ordering Uncertain Prospects.

F. D. Holzman: The Ruble Exchange Rate and Soviet Foreign Trade Pricing Policies 1929-1961.

S. T. Hsiao: Some Notes on the Elasticity of Substitution.

D. W. Jorgenson and C. D. Siebert: A Comparison of Alternative Theories of Corporate Investment Behavior.

David Levhari and Don Patinkin: The Role of Money in a Simple Growth Model.

James Melvin: Production and Trade with Two Factors and Three Goods.

E. J. Mishan: What is Producer's Surplus?

M. E. Moyer and D. W. Paden: On the Efficiency of the High School Economics Course.

R. R. Nelson: A "Diffusion" Model of International Productivity Differences in Manufacturing Industry.

G. H. Orcutt and A. G. Orcutt: Incentive and Disincentive Experimentation for Income Maintenance Policy Purposes.

G. H. Orcutt, H. W. Watts, and J. B. Edwards: Data Aggregation and Information Loss.

Vladimir Stoikov and R. L. Raimon: Determinants of Differences in the Quit Rate among Industries.

T. J. Wales: Distilled Spirits and Interstate Consumption Effects.

R. L. Weil, Jr.: Allocating Joint Costs.

B. A. Weisbrod and W. L. Hansen: An Income-Net Worth Approach to Measuring Economic Welfare.

## NOBEL ECONOMICS PRIZE

A new Nobel Prize, in economics, has been added to the five distributed since 1901 under the will of Alfred Nobel, the Swedish inventor of dynamite. The board of Sweden's Central Bank decided to celebrate the bank's 3C0th anniversary on May 15, 1968 by instituting the new prize, to be awarded for the first time in 1969. The bank will provide the funds for the economics award, which will amount to the same as other Nobel Prizes, at the moment about $65,000. Winners are to be selected by the Swedish Royal Academy of Science, which also makes the Nobel physics and chemistry awards. Economists all over the world will have the opportunity to nominate candidates. The other Nobel Prizes are those in literature, awarded by the Swedish Academy; in physiology or medicine, by the Royal Caroline Institute, and in peace, by a five-member committee named by the Norwegian Parliament.

## VISITING SCIENTIST PROGRAM IN ECONOMICS

The American Economic Association has received a further grant from the National Science Foundation to continue its "Visiting Scientist Program in Economics" during the 1968-69 academic year. The purpose of this program is to stimulate improved teaching and interest in modern economics at colleges and universities whose major focus is at the undergraduate level. Visits to about 40 campuses have been provided by the program in 1967-68.

The NSF grant provides financing for visits to such campuses by distinguished economists, who normally will spend a day or a day and a half on such a visit. The program for each visit is planned jointly between the visitor and the host institution; customarily it includes a talk to undergraduate major students, perhaps an informal seminar with faculty and students, discussion of current course and research interests of the host faculty, and other activities as may be desirable. While the ultimate concern is to encourage greater interest in, and better teaching of, economics at the undergraduate level, visitors' talks may be on research, current developments in economics, policy issues, or other topics that may seem appropriate to the needs of the particular institution.

This program is under the general direction of the Association's Committee on Economic Education. Professor Phillip Saunders, Department of Economics, Carnegie-Mellon University, administers the program, under the policies established by the Committee. Professor Saunders works with an informal roster of economists around the country who may be available for such visits, depending on their own schedules and the degree of common interest between them and the inviting institutions. Institutions are free to suggest visitors they would especially like to have, so long as these are within a radius of 100-200 miles of the campus, in order to minimize traveling costs. The host institution is expected to provide lodging and meals for the visitor when he is on the campus; other costs will be covered by the NSF grant.

Any institution that wants further information on this program, or wishes to submit a request for a "visiting scientist" during 1968-69, is invited to write directly to Professor Phillip Saunders at Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213.

## Announcements

The Fourth Congress of the International Economic History Association will be held September 9-14, 1968, at Indiana University. Headquarters of the meetings will be the Indiana Memorial Union of the University. Requests for information about the program

should be addressed to Professor Jean-François Bergier, Secretary General of the International Economic History Association, University of Geneva, rue de Candolle, 1205, Geneva, Switzerland. Information about local arrangements may be obtained from Professor Ross M. Robertson, 670 School of Business, Indiana University, Bloomington, Indiana 47401.

On October 14-16, 1968, Duke University and the College on Simulation and Gaming of the Institute of Management Sciences will sponsor a symposium on "The Design of Computer Simulation Experiments with Models of Economic Systems." The symposium will be held at Duke University. Among the speakers are Albert Ando, University of Pennsylvania, Michael Evans, University of Pennsylvania, Gary Fromm, The Brookings Institution, Martin Shubik, Yale University, Daniel Teichroew, Case Western Reserve University, and Donald Watts, University of Wisconsin. For detailed information about the symposium write to Professor Thomas H. Naylor, Department of Economics, Duke University, Durham, North Carolina 27706.

The National Institute of Social and Behavioral Science will hold its regular sessions for contributed papers at the 135th annual meeting of the American Association for the Advancement of Science, December 26-31, 1968, in Dallas, Texas. Sessions are held in cooperation with the Section on Social and Economic Sciences of the A.A.A.S. Members of the American Economic Association interested in presenting a paper at these sessions are invited to forward titles and abstracts of 300 words to Donald P. Ray, Director, National Institute of Social and Behavioral Science, 863 Benjamin Franklin Station, Washington, D.C. 20044, not later than August 25th. Papers should concern well-advanced or recently completed research in any field of economics, or in interdisciplinary studies. Of particular interest would be research in labor economics.

The Federal Reserve Board is putting renewed stress on the need for improving the scope and quality of measures of price change. This is being attempted in order to permit a better understanding of the forces leading to such changes, and of the impact of alternative monetary and fiscal policies on the price level.

To accomplish these objectives, the Board has initiated a broad research program focusing on the conceptual and operating problems in the development of price measures needed for policy formulation. For this purpose, the Board has enlisted the services of a panel of distinguished scholars to work with the Board's staff in encouraging additional research in the area of prices. In some cases, it may also be possible for the Federal Reserve to facilitate the initiation of price research projects by private individuals which could not be started due to a lack of financial support.

The interests of the panel, and of the Federal Reserve, are not limited to any one area of research, but range over a wide variety of topics. For information, on the Committee and its activities, or to inquire about financial support for research projects, write to Alexander J. Yeats, Secretary, Federal Reserve Board Committee on Price Measurement, Board of Governors of the Federal Reserve System, Washington, D.C. 20551.

The Committee on International Exchange of Persons now has a list of foreign scholars in the field of economics and business administration who have been nominated for travel grants under the Fulbright-Hays program in the event that arrangements can be confirmed for remunerative teaching or research appointments in U.S. colleges and universities for the 1968-69 academic year.

Information about these scholars will be sent to university and college officials on request. Inquiries should be addressed to: Miss Grace E. L. Haskins, Program Officer, Committee on International Exchange of Persons, Conference Board of Associated Research Councils, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

## Deaths

Ayers Brinser, summer, 1967.

Curtis M. Elliott, professor of economics, University of Nebraska, January 9, 1968.

Milford K. Kellogg, professor of accounting, Butler University, March 3, 1968.

Paul W. McGann, December 24, 1967.

John Parker, associate professor of economics, University of Michigan, December 22, 1967.

Charles J. Scully, professor of economics, Boston College, September 24, 1967.

Wayne C. Taylor, trustee, National Planning Association and member, Committee for Economic Development, November 22, 1967.

Charles M. Tiebout, professor of economics, University of Washington, January 16, 1968.

Carl F. Wehrwein, December 29, 1967.

## Retirements

Harold M. Eswine, professor of economics, College of Business Administration, Kent State University, June 1968.

Robert Ford, associate professor of economics, University of Michigan, July 1, 1968.

Edward B. Schmidt, professor of economics, University of Nebraska, June 1968.

John H. Sheehan, associate professor of economics, University of Notre Dame, June 1968.

John G. Smale, professor of economics, Chico State College, June 1968.

Philip Taft, professor of economics, Brown University, June 1968.

James M. Waller, professor of banking and finance, College of Business Administration, University of Georgia.

## Visiting Foreign Scholars

George C. Archibald, University of Essex: visiting professor of economics, University of Washington, summer 1968.

Sukhamoy Chakravarty, University of Delhi: visiting professor of political economy, Johns Hopkins University, 1968-69.

Michael Davenport, University of York: visiting associate professor of finance, Graduate School of Business Administration, New York University.

P. Sargant Florence, professor emeritus, University of Birmingham: visiting distinguished professor, University of Rhode Island, spring 1968.

S. Herbert Frankel, University of Oxford: visiting professor of economics, University of Virginia, spring 1968.

Georgui T. Georgiev, Institute of Economics and Organization of Agriculture, Bulgarian Academy of Agricultural Sciences: visiting research specialist, department of agricultural economics, University of Minnesota.

Robert G. Gregory, London School of Economics: visiting assistant professor, Northwestern University, fall 1968.

Ronald M. Hartwell, University of Oxford: visiting professor of economics, University of Virginia, spring 1969.

Sultan Hashmi: visiting professor, University of Pittsburgh, April 1968.

Branko Horvat: visiting scholar, department of economics, University of Michigan, March 1-June 30, 1968.

Anthony Lancaster, University of Birmingham: visiting associate professor of economics, University of Washington, 1968-69.

Assar Lindbeck, Stockholm School of Economics: Wesley Clair Mitchell Research Professorship, Columbia University, 1968-69.

Nissan Liviatan, The Hebrew University: visiting professor of economics, Massachusetts Institute of Technology, 1968-69.

James A. Mirrlees, Oxford University: visiting professor of economics, Massachusetts Institute of Technology, spring 1968.

Balwanth Reddy, University of Essex: visiting lecturer in economics, Northwestern University, fall 1968.

Hedley J. B. Rees, University of Nottingham: visiting assistant professor of statistics, Massachusetts Institute of Technology, 1968-69.

Brinley Thomas, University College, Cardiff: Hinkley Professor, department of political economy, Johns Hopkins University, fall 1968.

Hermann von Steun, Nancy, France: visiting lecturer in marketing, School of Commerce and Business Administration, University of Alabama.

## *Promotions*

Guvenc Alpander: associate professor of management, University of Maine.

Robert E. Berney: associate professor of economics, Washington State University.

H. Marshall Booker: assistant professor of economics, Old Dominion College.

Leonard E. Chadwick: associate professor of economics, San Diego State College, September 1968.

Herbert A. Chesler: associate professor, University of Pittsburgh, fall 1968.

George deMenil: assistant professor of economics, Boston College.

John V. Donovan: assistant professor of economics, Whittemore School of Business and Economics, University of New Hampshire, February 1968.

Wilson L. Farman: professor of economics, Colgate University, July 1, 1968.

Roderick A. Forsgren: associate professor of management, University of Maine.

William L. Henderson: John E. Harris Professor of Economics, Denison University.

James O. Horrigan: associate professor of business administration, Whittemore School of Business and Economics, University of New Hampshire, February 1968.

Chi-Ming Hou: first Charles A. Dana Professor of Economics, Colgate University, February 1, 1968.

Donald L. Huddle: associate professor of economics, Rice University.

William R. Hughes: associate professor of economics, Boston College.

Ronald L. Jensen: associate professor of business administration, Emory University.

Leroy Johnson: associate professor of business administration, Washington State University.

Ronald W. Jones: Munro Professor of Economics, University of Rochester.

Edward J. Kane: professor of economics, Boston College.

John W. Korbel: associate professor of business administration, Whittemore School of Business and Economics, University of New Hampshire, February 1968.

Marian Krzyzaniak: professor of economics, Rice University.

Lester B. Lave: associate professor of economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

Ferdinand K. Levy: professor of economics, Rice University.

Stephen R. Lewis Jr.: associate professor of economics, Williams College.

Gary A. Luoma: associate professor of business administration, Emory University.

Asatoshi Maeshiro: associate professor, University of Pittsburgh.

Melvin T. McClure: associate professor of accounting, University of Maine.

Robert J. McEwen: professor of economics, Boston College.

Timothy McGuire: assistant professor of economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

Lionel W. McKenzie: Wilson Professor of Economics, University of Rochester.

Francis M. McLaughlin: associate professor of economics, Boston College.

Jack W. Nickson Jr.: professor of economics, Old Dominion College.

Leroy E. Pagano: instructor, School of Business Administration, The American University, fall 1968.

Doris G. Phillips: professor of economics, California State College at Fullerton.

Charles Plott: associate professor of economics, Krannert Graduate School of Industrial Administration, Purdue University.

Perry L. Roets: department of economics, Marquette University.

Robert Rogow: associate professor, department of economics and commerce, Simon Fraser University.

Richard Roll: assistant professor of economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

David Rutenberg: assistant professor of economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

Kehar S. Sangha: professor of economics, Old Dominion College.

Thomas Sargent: assistant professor of economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

Lewis M. Schneider: associate professor of business administration, Harvard University, July 1, 1968.

Nancy L. Schwartz: associate professor of economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

Stephen L. Shapiro: assistant professor of economics, Old Dominion College.

Morris Silver: associate professor of economics, The City College of The City University of New York.

Kenneth H. Smith: associate professor of economics, Hunter College of The City University of New York, January 1, 1968.

Leon Smolinski: professor of economics, Boston College.

Kenneth T. Strand: professor, department of economics and commerce, Simon Fraser University.

Akira Takayama: professor of economics, Krannert Graduate School of Industrial Administration, Purdue University.

Joseph R. Tarbet: professor of business administration, Washington State University.

George J. Viksnins: associate professor of economics, Georgetown University, fall 1968.

Dwayne Wrightsman: associate professor of finance, Whittemore School of Business and Economics, University of New Hampshire, February 1968.

Gerald L. Young: assistant professor of economics, Washington State University.

## Administrative Appointments

Ernest J. Bartell: chairman, department of economics, University of Notre Dame.

Philip W. Bell, Haverford College and Lincoln University: provost, Merrill College, University of California at Santa Cruz.

Wilbur E. Benson, Florida Atlantic University: professor of banking and finance and dean, College of Business Administration, University of Akron, July 1, 1968.

Joseph C. Blumel: dean of undergraduate studies and associate dean of the faculties, Portland State College.

Diran Bodenhorn: acting chairman, department of economics, Ohio State University.

Alice E. Bourneuf: vice chairman, department of economics, Boston College.

Edmund Brunner Jr.: associate head, department of economics, The RAND Corporation.

Rockwood Q. P. Chin, Wheaton College: professor of economics and assistant dean of the Graduate School, University of Connecticut.

Paul G. Craig: dean, College of Social and Behavioral Sciences, Ohio State University.

Dale L. Cramer: acting head, department of economics, School of Commerce and Business Administration, University of Alabama, 1967-68.

Peter L. Danner: associate professor and chairman, department of economics, Marquette University.

Doris M. Drury: professor of economics, Division of Administrative Environment, and chairman, Division of Research, College of Business Administration, University of Denver.

J. Robert Maddox: chairman, Division of Administrative Environment, College of Business Administration, University of Denver.

J. Carter Murphy: chairman, department of economics, Southern Methodist University.

Charles L. Quittmeyer: dean, School of Business Administration, College of William and Mary.

Daniel B. Rathbun, General Accounting Office, Washington, D.C.: director of planning and professor of economics, University of Pittsburgh, January 1968.

Albert Rees: director, Industrial Relations Section, Princeton University, July 1, 1968; succeeding Frederick H. Harbison, who is continuing as faculty associate.

Donald Sternitzke: acting chairman, department of economics, Bowling Green State University, 1968.

Thomas R. Swartz: associate chairman, department of economics, University of Notre Dame.

Alfred Tella, Federal Reserve Board: director, Labor Force Studies, President's Commission on Income Maintenance Programs, March 18, 1968.

Charles Wolf Jr.: head, department of economics, The RAND Corporation.

## Appointments

Mark Aldrich, University of Texas: assistant professor, Smith College.

John J. Andrews: associate professor of business administration, Emory University, September 1968.

Orley C. Ashenfelter: assistant professor of economics, Princeton University.

Allan R. Bailey: assistant professor of accounting, School of Business Administration, San Diego State College, February 1, 1968.

Robert Barro: assistant professor of economics, Brown University.

Richard E. Bennett: assistant professor of economics, College of Business Administration, Kent State University.

David Black: assistant professor of economics, Duke University, September 1968.

Frank J. Bonello: assistant professor of economics, University of Notre Dame, fall 1968.

H. James Brown, Indiana University: research staff associate, National Bureau of Economic Research.

John P. Brown: assistant professor of economics, Brown University.

Charles E. Butler: assistant professor of economics, University of Texas, spring 1968.

Sidney L. Carroll: assistant professor, Louisiana State University.

Steven N. S. Cheung: assistant professor of economics, University of Chicago, fall 1968.

Edwin Clark: visiting assistant professor of economics, Williams College.

Norris C. Clement, University of Colorado: assistant professor, San Diego State College.

Claude S. Colantoni: assistant professor of management and economics, Krannert Graduate School of Industrial Administration, Purdue University, September 1968.

Herman E. Daly, University of Ceara, Brazil: associate professor, Louisiana State University.

Eric G. Davis: assistant professor of economics, Krannert Graduate School of Industrial Administration, Purdue University, September 1968.

Horace B. Davis: special professor of economics, Hofstra University, spring 1968.

Karen Davis: instructor in economics, Rice University, July 1968.

Don J. DeVoretz: instructor, department of economics and commerce, Simon Fraser University.

W. Erwin Diewert: assistant professor of economics, University of Chicago, fall 1968.

John T. Donnelly: assistant professor, College of Economics & Business, Washington State University.

Margaret B. Dray: lecturer, Chicago City College.

Michael Duggan: associate visiting professor of economics, Whittemore School of Business and Economics, University of New Hampshire, 1967-68.

Mohamed El Hodiri: visiting associate professor of economics, University of Kansas, September 1968.

Daniel Ellsberg, Department of State: staff member, economics department, The RAND Corporation, summer 1967.

Ray C. Fair, Massachusetts Institute of Technology: assistant professor of economics, Princeton University.

Richard Fenton: assistant professor of economics, State University of New York, College at Brockport.

Filemon Flores, Jr., California State College: assistant professor of business management, School of Business Administration, The American University, fall 1968.

Robert W. Fogel, University of Chicago: professor of economics, University of Rochester, each fall quarter, beginning fall 1968.

N. Allen Ford: assistant professor, College of Economics & Business, Washington State University.

Bruce L. Gardner: assistant professor of economics, North Carolina State University, fall 1968.

Marshall Geer III: assistant professor of economics, University of Colorado, September 1968.

Martin Geisel: research associate in economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

Alan L. Ginsburg: assistant professor, The City College of The City University of New York, January-December 1968.

Herbert Glazer, Sophia University, Tokyo: associate professor of marketing and international business, School of Business Administration, The American University, fall 1968.

Roger C. Gledhill: assistant professor of economics, Old Dominion College.

Frederick L. Golladay: assistant professor, University of Wisconsin, Madison.

Robert J. Gordon: assistant professor of economics, University of Chicago, fall 1968, and research staff associate, National Bureau of Economic Research.

Leon S. Graubard: assistant professor of economics, Northeastern University.

Horace M. Gray: visiting professor of economics, University of Texas, spring 1968.

Kenneth V. Greene: assistant professor of economics, State University of New York at Binghamton.

Thomas J. Grenenes: assistant professor of economics, North Carolina State University, fall 1968.

Louis Guth: assistant professor, School of Commerce and Graduate School of Business Administration, New York University.

Merlin M. Hackbart: assistant professor, College of Commerce and Industry, University of Wyoming.

Joseph Hamilton, Chico State College: staff member, logistics department, The RAND Corporation, summer 1967.

Michael Hartley: assistant professor of economics, Duke University, September 1968.

Robert L. Heilbroner: professor, Graduate Facility, New School for Social Research.

Larry M. Hersh: instructor in economics, Northeastern University.

Robert L. Higgs: acting assistant professor of economics, University of Washington, 1968-69.

Terry M. Hogan: assistant professor of economics, Northwestern University, Evanston, fall 1968.

Janos Horvath: professor of economics, Butler University.

Mamoru Ishikawa, University of Pittsburgh: Catholic University, fall 1968.

Joseph M. Jadlow Jr.: department of economics, Oklahoma State University, September 1, 1968.

Dwight M. Jaffee, Massachusetts Institute of Technology: assistant professor of economics, Princeton University.

Frank J. Jones: assistant professor of economics, University of Notre Dame, fall 1968.

Arthur E. Kartman, University of Washington: assistant professor, San Diego State College.

Peter E. Kennedy, University of Wisconsin: visiting assistant professor of economics, Cornell University, spring 1968.

Richard E. Kihlstrom: assistant professor of economics, Northwestern University, Evanston, fall 1968.

Paul S. Kirshenbaum: assistant professor of economics, Hunter College of The City University of New York, September 1, 1967.

James T. Kneafsey, Ohio State University: assistant professor, University of Pittsburgh, fall 1968.

Arnold F. Kroner, Cornell University: assistant professor, University of Pittsburgh, fall 1968.

George M. Lady, Rice University: Resource Management Corporation, Bethesda, June 1968.

Duane E. Leigh: assistant professor, College of Economics & Business, Washington State University.

Charles A. Lenard: instructor, College of Economics & Business, Washington State University.

Sar A. Levitan, Upjohn Institute: research professor of economics, George Washington University, 1967-68.

Kevin M. Lightner: assistant professor of accounting, School of Business Administration, San Diego State College.

Charles H. Little, Oklahoma State University: assistant professor, departments of experimental statistics and economics, North Carolina State University, fall 1968.

Cliff L. Lloyd, Krannert Graduate School of Industrial Administration, Purdue University: professor of economics, State University of New York at Buffalo.

Oscar M. Lund Jr., Bethel College: research fellow, department of agricultural economics and Agricultural Extension Service, University of Minnesota.

Murugappa C. Madhaven, University of Wisconsin: assistant professor, San Diego State College.

Wilbur R. Maki, Iowa State University: professor of agricultural economics and coordinator of resources and community development, Agricultural Experiment Station, University of Minnesota.

Garth L. Mangum, Upjohn Institute: research professor of economics, George Washington University, 1967-68.

Paul J. Markowski: lecturer in economics, Brooklyn College.

Joseph R. Mason: assistant professor of economics, State University of New York, College at Brockport.

B. John Mathis: associate professor of economics, State University of New York, College at Brockport.

Charles McConnel: instructor in economics, Occidental College.

E. William McElroy, University of Buffalo: assistant professor, Georgetown University.

Earl C. McFarland: assistant professor of economics, Williams College.

John S. McGee, University of North Carolina: professor of economics, University of Washington, 1968-69.

Stephen K. McKnees: assistant professor of economics, Williams College.

Charles Metcalf: assistant professor, University of Wisconsin, Madison.

Robert H. Meyer Jr.: assistant professor of economics, Krannert Graduate School of Industrial Administration, Purdue University, September 1968.

Frank B. Miller, Cornell University: visiting professor, department of economics and commerce, Simon Fraser University.

Roger L. Miller: acting assistant professor of economics, University of Washington, 1968-69.

William J. Moore, University of Texas: assistant professor of economics, University of Oklahoma, September 1, 1968.

Woo Hyun Nam, University of Washington: assistant professor, San Diego State College.

Ranganathan Narayanan: research associate in economics, Graduate School of Industrial Administration, Carnegie-Mellon University.

David M. Nelson: research associate, department of agricultural economics and Agricultural Extention Service, University of Minnesota.

Walter L. Ness Jr.: assistant professor of finance, Graduate School of Business Administration, New York University.

Walter Nicholson: assistant professor of economics, Amherst College, July 1968.

Norman P. Obst: acting assistant professor of economics, University of Washington, 1968-69.

Jack Ochs, Washington University: assistant professor, University of Pittsburgh, fall 1968.

Jan Parker: associate professor of economics, Sweet Briar College.

Lewis Perl: assistant professor of industrial and labor relations, New York State School of Industrial and Labor Relations, Cornell University, February 1969.

Nicholas S. Perna: assistant professor of economics, Williams College.

Richard K. Perrin: assistant professor of economics, North Carolina State University, spring 1968.

Jonathan J. Pincus: instructor, department of economics and commerce, Simon Fraser University.

J. Eugène Poirier: assistant professor, Georgetown University.

Michael G. Porter: instructor, department of economics and commerce, Simon Fraser University.

Richard H. Puckett, The American University: adviser, Board of Governors of the Federal Reserve System.

Laura R. Randall: assistant professor of economics, Hunter College of The City University of New York, February 1, 1968.

V. Lane Rawlins: assistant professor, College of Economics & Business, Washington State University.

Uwe E. Reinhardt, Yale University: assistant professor of economics, Princeton University.

Roger Riefler: assistant professor, University of Pittsburgh, fall 1968.

Kjell A. Ringbakk: assistant professor of marketing, School of Business Administration, San Diego State College.

Herbert J. Roth: assistant professor of economics, College of Business Administration, Kent State University.

Michael Rothschild: instructor in economics, Boston College.

Charles M. Sackrey Jr., Ithaca College: assistant professor, Smith College.

Warren J. Samuels, University of Miami: department of economics, Michigan State University, September 1, 1968.

Edward Selby, North Eastern Louisiana State College: associate professor of banking and finance, College of Business Administration, University of Georgia.

William R. Sherrard: assistant professor of management, School of Business Administration, San Diego State College, September 1968.

Roger B. Skurski: assistant professor of economics, University of Notre Dame, fall 1968.

D. Stanton Smith: assistant professor, College of Economics & Business, Washington State University.

Gordon Smith, University of California, Berkeley: assistant professor, Rice University, July 1, 1968.

David W. Stevens: department of economics, Oklahoma State University, August 1, 1968.

Bernt Stigum: associate professor of economics, Northwestern University, Evanston, fall 1968.

Vladimir Stoikov: visiting professor of industrial and labor relations, New York State School of Industrial and Labor Relations, Cornell University, 1968-69.

Ernst W. Stromsdorfer: associate professor of economics, Pennslyvania State University.

Raymond Struyk, Washington University: research staff associate, National Bureau of Economic Research.

Richard E. Sylla: assistant professor of economics, North Carolina State University, fall 1968.

Philip Taft, Brown University: visiting professor of industrial relations, State University of New York, Buffalo, 1968-69.

Peter Temin, Massachusetts Institute of Technology: research staff associate, National Bureau of Economic Research.

Henry Thomassen, Emory University: associate professor, University of Nebraska.

Cecilia V. Tierney: associate professor, College of Economics & Business, Washington State University.

Richard F. Trestrail: associate professor of economics, Marquette University.

Martin A. Ulrich: instructor, department of economics and commerce, Simon Fraser University.

James Verbrugge, University of Kentucky: associate professor of banking and finance, College of Business Administration, University of Georgia.

Fritz Von Beek: instructor in economics, The American University, 1968-69.

William C. Wedley, University of Libya: instructor, department of economics and commerce, Simon Fraser University.

Kelso L. Wessel: associate professor, department of agricultural economics and rural sociology, Ohio State University, and member, Ohio State Contract Team in Piracicaba, Brazil.

Richard E. Westin: assistant professor of economics, Northwestern University, Evanston, fall 1968.

Larry E. Westphal, Harvard University: assistant professor of economics, Princeton University.

James E. Williamson: assistant professor of accounting, School of Business Administration, San Diego State College, September 1968.

Nail C. Yucel: assistant professor, College of Economics & Business, Washington State University.

## Leaves for Special Appointments

Leland S. Burns, University of California, Los Angeles: Netherlands Economic Institute and Netherlands School of Economics, Rotterdam, 1968.

Martin K. Christiansen, University of Minnesota: Economic Research Service, Department of Agriculture, Washington, D.C.

Peter Franck, Syracuse University: visiting professor of economics, Columbia University, spring 1969.

George W. Hilton, University of California, Los Angeles: acting curator of transportation, Smithsonian Institution, 1968-69.

William N. Leonard, Hofstra University: consultant, Federal Trade Commission, Washington, D.C.

Cono Casella, Arthur T. Roth Graduate School of Business Administration: Fulbright lecturer in economics, Johns Hopkins University in Bologna, 1968-69.

Morris D. Morris, University of Washington: The Institute for Advanced Study, Princeton University, in an experimental program in the study of social change, 1968-69.

Sam Peltzman, University of California, Los Angeles: Graduate School of Business, University of Chicago, 1968-69.

Orme W. Phelps, Claremont Men's College: visiting professor of economics, State University of New York, College at Brockport, 1968-69.

Charles J. Siegman, Federal Reserve Board, Washington, D.C.: consultant, Bank for International Settlements, Basle, January-June 1968.

Harold M. Somers, University of California, Los Angeles: Yale Law School, Yale University, fall 1968.

Richard K. Stuart, Whitman College: Fulbright lecturer in business and economics, Faculty of Public and Business Administration, University of Tehran, 1967-68.

Clemens B. Thoman, University of Nebraska: visiting professor, Pahlavi University, Shiraz, Iran.

George J. Viksnins, Georgetown University: program economist, Agency for International Development, Bangkok, 1968-70.

Dean A. Worcester Jr., University of Washington: extended Rockefeller Foundation Fellowship, University of the Philippines, 1968-69.

## Resignations

Herbert M. Bernstein, Washington and Jefferson College, June 1968.
Paul Medow, New School for Social Research.

## Miscellaneous

Gardner Ackley, University of Michigan: appointed U.S. Ambassador to Italy, March 1968.

O. B. Jesness, professor emeritus, University of Minnesota, awarded a 50th Anniversary Commemorative Medal by the Federal Land Bank for outstanding contributions to agriculture.

E. Fred Koller, University of Minnesota, awarded a 50th Anniversary Commemorative Medal by the Federal Land Bank for outstanding contributions to agriculture.

## NATIONAL REGISTRY FOR ECONOMISTS

The National Registry for Economists was established in January, 1966, to provide a centralized nationwide clearinghouse for economists on a year-round basis. It is located in the Chicago Professional Placement Office of the Illinois State Employment Service and is staffed by experienced placement personnel, operating under the guidance and direction of Regional and National Bureau of Employment Security Professional Placement officials, and in cooperation with the American Economic Association. It is a free service. There are no registration, referral, or placement fees. Application and order forms used in the Registry are available upon request from the: National Registry for Economists, Professional Placement Center, 208 South La Salle Street, Chicago, Illinois, 60604.

## AMERICAN ECONOMIC ASSOCIATION
## VACANCIES AND APPLICATIONS

The Association is glad to render service to applicants who wish to make known their availability for positions in the field of economics and to administrative officers of colleges and universities and to others who are seeking to fill vacancies.

The officers of the Association take no responsibility for making a selection among the applicants or following up the results. The Secretary's office will merely afford a central point for clearing inquiries; and the *Review* will publish in this section a brief description of vacancies announced and of applications submitted (with necessary editorial changes). Since the Association has no other way of knowing whether or not this section is performing a real service, the Secretary would appreciate receiving notification of appointments made as a result of these announcements. It is optional with those submitting such announcements to publish name and address or to use a key number. Deadlines for the four issues of the *Review* are February 1, May 1, August 1, and November 1.

Communications should be addressed to: The Secretary, American Economic Association, 629 Noyes Street, Evanston, Illinois, 60201.

### *Vacancies*

*Economists, mathematicians, statisticians, operations analysts:* Needed by the Research Analysis Corporation to participate in defense-related studies of resource allocation techniques and applications. Areas of interest include systems analysis of defense forces, weapon systems, and manpower and material resources, and its constituent elements of cost-effectiveness analysis and military cost analysis. A strong capability is maintained in computer-assisted model building. Staff members are assisted in acquiring a working knowledge of computer techniques if they do not already have it. Candidates should have at least a master's degree. For additional information, send résumé to Mr. John G. Burke, Supervisor of Professional Staffing, Research Analysis Corporation, McLean, Virginia 22101.

*Labor economists and/or statisticians:* The measurement of the economic damages suffered by those who are wrongly injured or killed is a new area for the application of economic and statistical knowledge and research techniques. This field has been pioneered successfully and Associated Appraisers of Earning Capacity is now providing this service to attorneys on a nationwide basis. Those in it appraise the losses and are required to testify as an expert in court trials and must withstand

hostile cross-examination. It is possible to engage in it as a part-time activity. Requirements: (1) minimum status of associate professor; (2) experience in research in collective bargaining agreements and fringe benefit programs; (3) location in or near a major metropolitan area. Openings now available in some 20 cities. Waiting list open in other areas. Send résumé and list of publications to: Philip Eden, President, Associated Appraisers of Earning Capacity, 1303 Walnut Street, Berkeley, California, 94709.

*Economic statistics, operations analysis, management science and/or management systems:* New Department of Management Sciences needs three additional Ph.D.'s September, 1968. Rank and salary commensurate with qualifications. TIAA, life, disability, and major medical insurance and other fringe benefits. Please send résumé to: Dr. Sam Barone, Chairman, Department of Management Sciences, St. Louis University, School of Commerce and Finance, 3674 Lindell Boulevard, St. Louis, Missouri, 63108.

*Assistant or associate professor:* Department of Commerce, commencing September, 1968. Ph.D. or D.B.A. completed or in progress in financial management, production management, or quantitative methods in business. Business experience desirable. Apply to: B. A. Robinson, Department of Commerce, Acadia University, Wolfville, Nova Scotia, Canada.

*Economists and regional planners:* The Maryland-National Capital Park and Planning Commission has challenging positions at various levels for economists and planners. The positions have a salary range of $10,303 to $13,914. The duties to be performed are: economic soundness analysis of regional and county plans; evaluation of current economic trends, projections of economic activity, and cost-benefit studies of various county and regional activities. The positions are located in Montgomery and Prince George's Counties of the Washington Metropolitan Area. Applicants for these positions should apply to: Hameed Naz, Chief, Research Division, or David K. Metzger, Personnel Officer, 8787 Georgia Avenue, Silver Spring, Maryland, 20907.

*Applied economist:* For Paris-based, international research group. Senior position offering challenging assignments in national accounts analysis, forecasting of economic conditions, structural industry studies and market projections. Salary $8,500-$11,000 p.a., depending on qualifications and experience (minimum five years in relevant field; command of French or other European language). Send detailed résumé.                                                                                      P345

*Accounting and marketing:* Applications are requested for a two-year appointment, effective September 1, 1968, for the 1968-69 and 1969-70 academic years, to replace a department member on a leave of absence. The teaching load of 12 hours each semester will consist of one section of principles of marketing and three sections of elementary accounting. Applicants with the master's degree and no experience will be considered for appointment at the rank of instructor. Further graduate work and experience may qualify an applicant for appointment at the rank of assistant professor. Write to: Dr. William F. Railing, Chairman, Department of Economics and Business Administration, Gettysburg College, Gettysburg, Pennsylvania, 17325.

*Fishery economists:* Wide variety of economics research, ranging from international agreements, quotas, and tariffs to price analyses, business management of firms, cost-benefit analyses, and whole field of the economics of natural resources. Positions are in the Federal Civil Service at Grades GS-9 ($8,054) to GS-14 ($15,841). Basic requirements are Ph.D. or master's in economics or agricultural economics; training in international, natural resource, and/or quantitative economics would be helpful. Positions are located at the University of Maryland and in Washington, D.C. Civil Service Commission Form 57 (Application for Federal Employment) should be sent to: Personnel Office, Bureau of Commercial Fisheries, U.S. Department of the Interior, 18th and C Street, N.W., Washington, D.C., 20240.

*Economists, loan officers, financial analysts, and economic editors:* The Asian Development Bank invites applications to these career opportunities in its Manila Headquarters. A minimum of a university degree is required: preference, however, will be given to applicants possessing higher academic qualifications. Extensive experience in development banks, government institutions, international financial institutions and consulting firms would be an asset. Economists should be capable of appraising economic conditions in a particular country or region and should have a general, industrial, or agricultural economics background. Loan officers will

undertake appraisal duties related to loans for specific projects in both public and private sectors. These posts require that candidates have the ability to analyze projects in each sector of the national economy. Financial analysts will perform analysis and preparation of reports related to the financial viability of proposed projects. Candidates must be economics and business majors, preferably with statistical background and with extensive experience in analysis and interpretation of financial date. Economic editors will edit economic and technical papers, reports, and publications. Economic background and experience in such work is essential. Salary range is up to U.S. $12,000 per annum for junior levels and up to U.S. $16,000 for senior levels, depending on qualifications and experience. Application forms and further details are available from: Personnel Division, Asian Development Bank, P.O. Box 126, Makati, Rizal, Philippines.

*Economic research and consulting services:* Mathematica, a Princeton based research and consulting organization with additional offices in Bethesda, Maryland, is looking for a mature and experienced person to head up the company's first growing contract research activities in the area of economic analysis. An excellent academic background and willingness to apply theoretical knowledge to the solution of industrial and financial problems is required. Experience in supervising staff, directing projects, and preparing proposals is necessary. Compensation and benefits are excellent. Address inquiries to: Dr. Tibor Fabian, President, Mathematica, One Palmer Square, Princeton, New Jersey, 08540.

*Economist:* Permanent teaching position available in September, 1968, in liberal arts college located in southwestern Colorado. Requires Ph.D. Teaching interest in statistics and quantitative methods preferred.                                                      P347

*Economics:* One vacancy, one new position. Ph.D. preferred. Salary to $14,000; twelve-hour teaching loan. Research encouraged but not required. Introductory courses and variety of advanced courses. Managerial economics, statistics preferred for one position. Contact: Dr. Jack Robertson, Director, Division of Business Administration and Economics, West Virginia Institute of Technology, Montgomery, West Virginia, 25136.

*Marketing and economics or finance:* Ph.D. preferred. Salary to $14,000. Variety of courses of choice. Twelve-hour teaching load. Research encouraged but not required. Contact: Dr. Jack Robertson, Director, Division of Business Administration and Economics, West Virginia Institute of Technology, Montgomery, West Virginia, 25136.

*Economics and finance:* An expanding graduate program in real estate and urban development has an opening for an economist with a special interest in urban land economics, real estate finance and valuation. Flexible teaching assignment to provide opportunity for program development and research. Opportunities to participate in dynamic interdisciplinary programs on university-wide basis. Rank and salary open.                                                                                                   P348

*Labor economists and/or statisticians:* The A.S.E.A. is a nonprofit professional society of economist-statisticians who appraise (1) life-time economic losses of persons, suffered as a result of wrongful death or injury or violation of legal rights; (2) economic losses of businesses resulting from a wrongful act; and (3) the future income of property and the appraisal of income property by the capitalization of income method. Examinations are open to all persons with the following minimum qualifications: Ph.D. in economics, associate professorship in economics or statistics, experience in labor economics. The examination covers the application of economic and statistical techniques and the mathematics of finance to these areas of appraisal. Passage of these examinations helps establish qualifications and competence to do this work in general consulting practice as well as in courts of law. For details, please write to: Dr. Norman H. Leonard, Chairman, Board of Examiners, American Society of Econometric Appraisers, 328 North Liberty Street, Delaware, Ohio, 43015.

*Economists:* Office of International Operations, Internal Revenue Service, has unique and intellectually challenging career opportunities for economists in Washington, D.C. Nature of work is primarily concerned with applying economic analysis to intercorporate activities between related corporations to ascertain whether they reflect competitive arm's length standards. Basic function is to examine and ana-

lyze transactions involving goods and services flowing between related corporations to determine whether the intercorporate transfer prices meet the arm's length standard. Conclusions are then drawn as to whether the corporation has clearly reflected its true taxable income. These economic analyses cover the entire spectrum of business activity and will have an important bearing on the development of tax law guidelines and precedents involving intercorporate pricing in the expanding area of international commerce. Positions are available at entrance salaries ranging from $11,000 to nearly $16,000. Position and starting salary will depend upon educational background and professional experience. For further details, write to: Director of International Operations, Attention of Chief, Economic Advisory Branch, Internal Revenue Service, Washington, D.C., 20225.

*Managerial economics, econometrics, macroeconomics, economic history, or Asian economics:* Vacancies also for general economists for permanent or temporary positions from late 1968 or early 1969, within a salary range NZ$3,000-$6,200 per annum. For permanent positions, generous provision for fares and removal expenses; also good superannuation scheme and subsidized study leave. Curriculum vitae, list of publications, names and addresses of two or three confidential referees to and further information from: Registrar, University of Auckland, Box 2175, Auckland, New Zealand.

*Economics:* Assistant professor to teach undergraduate courses in economic theory, monetary theory, public finance and/or economic thought. Ph.D. candidate with master's and experience preferred; salary to $9,000 for ten months; extensive T.I.A.A. benefits paid; additional compensation for summer sessions position. Starting September 1, 1968. Contact: Dr. Edward F. Stauber, Chairman, Department of Economics, St. John Fisher College, Rochester, New York, 14618.

*Economist, chairman of department:* Saint Mary's University invites applications for the position of chairman of its Economics Department. The Department is engaged in undergraduate work, and it is expected that an honors program will be added. The appointee will have a teaching load which will not exceed six hours, at least for the first year, and in no circumstances will exceed nine hours. The position is open only to those who have a Ph.D. degree. Although specialization in any area qualifies for application, preference will be given to those having a strong background in economic theory. The appointment will be effective September 1, 1968. Salary and rank depend on qualifications and experience. Write to: Dean H. G. Beazley, Commerce Faculty, Saint Mary's University, Halifax, Nova Scotia, Canada.

*Regional economists:* Pacific Technical Analysts, Inc., is expanding its Bangkok office to encompass the Pacific "rim." Needed are well-qualified professionals with specific experience in input-output analysis. Also, sector economists (agro-industry, transportation, labor) for microanalysis. Salary open; relocation, cost of living and rent allowances. Send full résumé to: Dr. Theodore Bullockus, PTAI, 4th Floor, BOAC Building, Bangkok, Thailand.

*Research economists:* Needed by leading financial organization to undertake broad-gauged fundamental economic studies. Rigorous analysis of capital markets and likely trends for the future. Flow of funds into and out of equity markets. Effect of securities markets on efficiency of capital allocation. Supplement regular research effort on current projects by focusing on longer-range studies and longer-range implications of policy questions. Candidates should have Ph.D. or be Ph.D. candidates in economics or finance. Starting salary depends on qualifications and experience. Write to: Stan West, Director of Research, New York Stock Exchange, 11 Wall Street, New York, New York, 10005.

*Economists, accounting, finance, management, marketing, mathematicians, statisticians:* Faculty openings for September, 1968, and future development at new upper-level and graduate unit of Pennsylvania State University, near Harrisburg. Doctorate preferred. Experience in teaching, business, or government considered. All rank levels. Further information from and résumé to: Richard H. Heindel, Dean of Faculty, The Capitol Campus, Pennsylvania State University, Middletown, Pennsylvania, 17057.

*Economists, junior and seniors:* Quantitative research in industrial economics, urban and transportation planning, and interregional economics. Economic model build-

ing, systems analysis, and cost-effectiveness studies. Immediate positions available in suburban Washington location. For personal interview, please send résumé to: Jack G. Faucett, Jack Faucett Associates, 8605 Cameron Street, Silver Spring, Maryland, 20910.

*Economics:* Michigan church-related (Methodist) four-year liberal arts college seeks M.A., M.B.A., Ph.D., or D.B.A. for teaching economics courses in 1968-69. Flexible course assignments; instructor, assistant or associate professor. Rank depending on applicant's qualifications. Beginning salary range: $7,000-$10,000'. Generous fringe benefits.                                                         P349

*Economist:* Ph.D., beginning September, 1968. ·Position in the area of labor economics or public finance and taxation. Rank of assistant or associate professor; salary range from $10,500 to $13,700; generous benefits. Applications should be sent to: Dr. Aretas A. Dayton, Director, Division of Social Sciences, Eastern Washington State College, Cheney, Washington, 99004.

*Economists:* The United Nations is actively recruiting practicing economists for posts in Headquarters, New York, and overseas. Qualifications required include: (1) an advanced degree in economics with training in at least three of the following special fields—economic planning, economic development, national income, fiscal and monetary policies, international trade and payments, statistical analysis, mathematical economics and econometrics; (2) experience in applied economic research and analysis in the fields of economic development, international trade, transportation, agriculture, industry, mineral and water resources or other areas relevant to UN programs; (3) proficiency preferably in more than one of the UN working languages (English, French, Spanish). Grade of appointment will depend on duration and quality of experience. Candidates meeting these requirements are invited to provide a brief résumé and to contact for further information: Office of International Organization Recruitment, Department of State, Washington, D.C., 20520.

*Economist:* Permanent teaching position in an expanding economics department. Interested in persons strong in theory with specialized interests in the areas of development, labor, regional or resource economics. Ph.D. or near Ph.D. required. Salary, $9,500 and up for academic year. For further information, write and send résumé to: Phillip A. May, Department of Economics, School of Arts and Science, Northern Michigan University, Marquette, Michigan, 49855.

*Economic analyst:* Opportunity for research in problems related to economic location factors, specific industries, and state and local public finance as a part of statewide planning program. $8,830-$10,930. Master's degree in economics, business administration or related fields, or bachelor's degree plus two years of employment in above fields, or six years of employment in above fields. Send résumé to: Harold I. Ames, Administrator, Connecticut Interregional Planning Program, State Office Building, Hartford, Connecticut, 06115.

*Research analyst:* Opportunity for research in problems related to economic location factors, specific industries, and state and local public finance as a part of statewide planning program. $7,530-$9,450. Bachelor's degree in economics, business administration or related fields, plus one year of employment in above fields, or five years of employment in above fields. Send résumé to: Harold I. Ames, Administrator, Connecticut Interregional Planning ·Program, State Office Building, Hartford, Connecticut, 06115.

*Economist:* The Wisconsin Bureau of State Planning has a permanent opening for a staff economist. The Bureau is concerned with long-range planning and long-range policy considerations. Within this framework, the staff economist would be involved in: economic forecasting, providing regular economic assessments for the Governor, organizing economic data systems, applying economic analysis to alternative plans, and determining whether or which mathematical "models" are necessary in the planning process. Starting salary would depend upon education and experience but would be between $10,500 and $14,500, with the top of one's pay range being about 25 percent higher. There are also generous fringe benefits and the job location is in Madison. Send résumé to: Mr. Roger Schrantz, Director, Bureau of State Planning, 1 West Wilson Street, Madison, Wisconsin, 53702.

*Economists:* The expanding contract research program of the Dikewood Corporation has created openings at various professional levels for researchers with a graduate degree. Knowledge of computer programming is desirable. Opportunities exist in mathematical economics, medical economics, cost-benefit analysis, regional and international development, transportation research, cost analysis, operations research, program-planning-budget analysis to work individually or as project leader. Most study projects involve multidisciplined efforts and thus provide the chance to broaden one's perspective and experience in other academic fields. Studies are performed for military aerospace, commercial, and governmental, nondefense customers. Dikewood Corporation is an organization of consulting scientists formed ten years ago in order to provide services in the fields of systems analysis, applied research, computer sciences, stock market investment advisory service, and mutual fund management. Please contact: Robert M. Carlisle, Dikewood Corporation, University Research Park, 1009 Bradbury Drive, S.E., Albuquerque, New Mexico, 87106.

*Transportation economist:* The Wisconsin Department of Transportation has a permanent staff opening in its planning division for an economist to head its newly created economic analysis section. Duties will include: application of benefit-cost analytical techniques to various transportation plan proposals; analyzing relationships among various modes of transportation; and projecting economic data needed for planning and financing proposals. The annual pay starts at $13,416 with a $55 per month increase after six months service; merit increases within grade can increase the salary to $17,472. Fringe benefits are excellent. Location of employment is Madison, Wisconsin. A second slightly lower paying position is also opening. Send résumé to: John Roslak, Acting Director of Administration, Wisconsin Department of Transportation, State Office Building, Madison, Wisconsin, 53702.

*Economist and/or regional research planner:* The Maryland State Planning Department has positions open for persons interested in interdisciplinary systems research, econometric forecasting and estimation, evaluative studies of public programs, specific resource analysis, and the development of management information systems. These positions provide an excellent opportunity for persons interested in broad-based research activities in an expanding statewide planning program and also in generalized regional socioeconomic research. Training in economics or statistics at the master's, near Ph.D., or Ph.D. level and up to three years of experience in economic research are required. These positions have a beginning salary range of $11,700-$14,579. Applicants should reply to: James J. O'Donnell, Director, Maryland State Planning Department, 301 West Preston Street, Baltimore, Maryland, 21201.

*Economists:* Micro or macro. Two openings for September, 1968. Ph.D. or dissertation stage. Salary for assistant $8,124-$10,560; associate, $9,875-$12,389. Appointment level depends on experience and qualifications. Assistant must have four years of teaching experience and associate must have had six years of teaching experience. Teach principles and advanced course at college of about 4,000 enrollment where emphasis is on good teaching. College expanding toward liberal arts and business administration program. State college on eastern seaboard convenient to Philadelphia and New York City.                                                    P350

*Economists, mathematicians, statisticians:* Requirements are Ph.D., D.B.A., or M.B.A. with course work completed for doctorate and college teaching, business, or government experience. Publications desirable but not essential. Salary range depending on education and other qualifications; nine months with summer session optional; annual increments; high fringe benefits; excellent possibilities for advancement. The college is a Catholic arts school located in upstate New York. Submit complete résumé, including transcripts and letters of reference.        P351

## Economists Available for Positions
### (Italics indicate fields of specialization)

*Economic problems of underdeveloped areas, international public and business finance, investment and accounting:* Man, 44, Indian (Goan), married, with Western education and background; B.S.C. (Econ.) from European university, Ph.D. dissertation in underdeveloped country economics in progress, preparing for final pro-

fessional accountancy examination. Twenty years of extensive experience in senior financial position in national transport undertaking in East Africa, 8 of which as officer in charge; employed since May, 1965, as auditor in U.S. government agency; business experience includes administrative as finance and accounts department head of moderate sized undertaking. Paper on population growth in underdeveloped country published. Extensive travel in Europe, Asia, and Africa. Excellent references. Seeks research, operational or administrative position with research organization, financial institution or business undertaking in U.S., Canada, or Europe. Prefers position offering creative challenge. Available in September, 1968.            E1688

*Economics:* Man, Indo-Pakistani, 33; M.A. Hons. (economic science), B.Com., B.Sc., A.C.C.S. Several years of teaching experience at various levels; chairman, department of commerce at a school. Desires teaching and/or research position at school or college level, preferably in a state with warm climate. Available any time at six-month notice.            E1693

*Microeconomics, history of economic thought, economic history:* Man, 35; M.B.A., Harvard, Ph.D., Columbia (economics). Four years of experience in financial departments of major U.S. corporations; 4 years of experience as an instructor and assistant professor of economics. Some publications. Research interests in human organization of "the firm." Desires research, consulting, and/or teaching position located in eastern Canada or U.S. Available in July, 1968.            E1715

*Economic theory (micro and macro), econometrics, economic thought, growth and development, international economics, monetary theory, money and banking, economic systems:* Man, 48. Fifteen years of teaching experience at graduate and undergraduate levels; modest publication. Desires relocation in a progressive institution.            E1721

*Economic development, industrial economics, operations research, econometrics:* Man, 39, Indian, now in U.S. with permanent resident status; Ph.D. (economics) from leading American university. Eleven years of research experience in government and business; modest publication record. Seeks position in research, business, or consulting in U.S. or Canada. Available in 1968.            E1726

*Economics, international trade, political science:* Man, 40, foreigner; B.A. in economics and political science, M.A. in philosophy (English and French). Twelve years of government experience in foreign trade, economics, administration, and politics. Speaks several languages. Seeks suitable position in private business, research institution, or international organization. Available in 1968.            E1742

*Micro and macro theory, growth and development, comparative systems, business cycles, international economics, money and banking:* Man, 35, married, Indian citizen and U.S. permanent resident; B.A. (commerce), M.A., Ph.D. Presently associate professor; 8 years of university teaching experience at the undergraduate and graduate levels; fellowships; modest publication record; administrative experience. Desires relocation to a teaching and/or research position; overseas appointments not ruled out. Available in September, 1968.            E1747

*Principles, economic development:* Man, 51, married; LL.D. and Pol.Econ. and Soc. Sci. D., plus 30 semester hours in economics. Seven years of experience in teaching. Desires any position at or near a university that would make possible completion of doctorate in economics.            E1752

*Statistics, mathematical economics, international economics, money and banking, public finance, micro- and macroeconomics, comparative economic systems, history of economic thought, business cycle:* Man, 29, married; B.A. and M.A. in economics, Ph.D. dissertation well under way. Two years of research experience; 2 years of teaching experience (principles and statistics). Seeks research and/or teaching position in North or West Coast of U.S. or Canada.            E1754

*Money and banking, monetary theory, macroeconomic theory, business cycles and forecasting, history of economic thought:* Man, 40, married; B.A., M.A., currently working on Ph.D. thesis. Seven years of college teaching; 3 years of economic and statistical research; publication; fellowships and grants. Prefers post with M.A. program. Available in June or September, 1968.            E1755

*Transportation, public utilities, statistics:* Man, 55, married; Ph.D. Phi Beta Kappa. Thirty years of experience as government economist performing and directing transportation research (air, truck, rail, and water); and as expert witness in administrative proceedings; 18 years of part-time college teaching of courses in transportation, public utilities, statistics. Desires position as director of research and/or witness with private firm or state or local government, teaching, research or administration with university. Prefers Washington, D.C., area. Available immediately. E1760

*Managerial economics, corporate finance, capital budgeting, economic and financial analysis:* Man, 25, single; Honors B.S. in chemistry, Ivy League, M.B.A. in economics. Substantial capability in French and Italian. Experience in economic and management consulting, write for publication, and tutoring. Seeks position outside the U.S. in teaching, consulting, or industry. Available in September, 1968. E1761

*Macro- and microeconomics, history of economic thought, international economics, money and banking, public finance, Indian economics:* Woman, 40, married; Ph.D. from 'American university, 1964. Six years of teaching experience. Presently teaching undergraduate and graduate classes in Delhi University, India. Desires university teaching position in U.S. Available in August, 1968. E1762

*International economics and finance, economic development, finance of enterprise in Latin America:* Man, 38, married; Ph.D. Ten years of college and university teaching experience; 2 years in central banking related to Latin America. Several years as director, program of research in economics and finance, Latin-American area, for U.S. corporation. Travel in academic, official and business capacities, including research fellowship. Proficient in Spanish and Portuguese. Seeks teaching and research position. E1763

*Principles, money and banking, corporation finance, transportation:* Man, single; Ph.D. University teaching and research experience. Publications. Prefers teaching and research. E1765

*Consumer economics, principles, money and banking:* Woman, 43, married; Ph.D. Sixteen years of college and university teaching experience. Prefers western area of country. E1773

*Corporation finance, investments, money and banking, economic theory, insurance:* Man, 37, married; B.A., M.B.A., Ph.D. in economics and business administration, defense of dissertation tentatively scheduled for early spring. Four years of university teaching experience, including some graduate courses in finance. Desires teaching and/or research position. Will relocate for improved teaching and research environment in or near a metropolitan center. Available in September, 1968. E1776

*Econometrics, scientific methodology, comparative economic systems, microeconomics, area studies:* Man, 38; B.B.A., M.A. (economics), Ph.D. (economics and philosophy). Advanced original work in mathematical logic; advanced logical model applications. Director, international consulting firm; 10 years of top U.S. university teaching experience; 10 years of top international business experience. Several foremost foundation awards; publications; fluency in several languages. Presently chairman of department at a graduate school. Desires a teaching, administrative, or research position in New York, Washington, D.C., New England, or internationally. Available early in 1968. E1779

*International economics, comparative economic systems, economic thought, economic history, development of capitalism:* Man; Ph.D. Unusual and broad experience and direct involvement in economic and social analyses and/or development of a series of foreign countries, with excellent personal and professional relations in all European countries and a fine teaching experience in the U.S.; fluent in several foreign languages. Looking for a leading position, teaching and/or research, with an important university or research organization, especially with institutions directly interested in developing of a joint Atlantic research institute or international relations and development. E1782

*Economics of developing areas, international economics, economic thought, resource economics, agricultural policy:* Man, 31, married, Indian national; Ph.D. from a U.S. university. Currently assistant professor at a U.S. state university. Several research papers and publications in U.S. and Indian journals. Nearly 6 years of

research experience and 2 years of teaching experience. Recipient of two national fellowships. Wishes to relocate. Seeks teaching and/or research position with university. Available in September, 1968.                                                    E1785

*Economic theory, fiscal and monetary analysis, national income accounting, corporate finance, industrial organization and marketing, labor economics, area studies, international and developmental economics:* Man, 43; Ph.D. in economics, major university. Foundation and university fellowships; 20 years of experience in government, university teaching, business research, and private consulting for many clients. Publications. Seeks part-time or temporary full-time economic consulting. Willing to travel.                                                             E1786

*International economics, labor economics, economic development, price theory:* Man, 40, single, Jordanian with permanent residence in Canada; License in Law, License in Economics, Doctor in Economics, Geneva University. Publications, several papers; presently associate professor in French Canadian university. Desires teaching position or research possibilities.                                          E1789

*Economics, business:* Man, 54, married; two Ph.D.'s (economics, business); C.P.A. Thirty years of teaching and administrative experience on undergraduate and graduate level; tax consultant; speaks ten languages; management consultant of internationally known corporations. Résumé upon request. Wishes to relocate.     E1793

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# SURVEYS OF NATIONAL ECONOMIC POLICY ISSUES AND POLICY RESEARCH

# SURVEYS OF NATIONAL ECONOMIC POLICY ISSUES AND POLICY RESEARCH

# FOREWORD

The two surveys of national economic policy issues and policy research published in this Supplement to *The American Economic Review* are the first in a new series of studies of economics in foreign countries, commissioned by the Publications Committee of the American Economic Association and under the editorship of Harry G. Johnson. The previous series, edited by George W. Hildebrand, sought to acquaint Anglophone economists with the significant developments in economics since the Second World War in the national literatures of the major non–English–speaking countries. This series, by contrast, is directed at economic policy issues, and the controversies and research to which they have given rise, in countries selected for one or more of three reasons: the intrinsic interest of the policy issues, the relevance of the policy issues to current policy issues in the United States, and the interest of the countries themselves as areas of involvement of American foreign economic policy with which U.S. economists are likely to become concerned.

Most appropriately, the first two surveys to be completed relate to countries which have long been concerned with the problem of what is currently conceived as "guidelines" or "incomes and prices" policy. In addition, Sweden is a recognized pioneer in social policy ("the poverty problem"), while Australia, as the dominant Anglo–Saxon country of the Pacific, has for various reasons been increasing in importance in U.S. trade and overseas investment.

Subsequent Surveys will deal with a variety of developing and developed countries of special interest to American economists.

HARRY G. JOHNSON

# THEORIES AND PROBLEMS IN SWEDISH ECONOMIC POLICY IN THE POST–WAR PERIOD

### By Assar Lindbeck*

The purpose of this paper is to survey some Swedish contributions to the theory and discussion of economic policy in the post-war period. These contributions are presented against the background of problems actually encountered in economic policy in Sweden. The emphasis is placed on questions which on the one hand are characteristic of the Swedish scene, and on the other hand may be of interest to a foreign public. Consequently, the author has not attempted to provide complete coverage of the subject.[1]

The survey begins by presenting a bird's eye view of growth and fluctuations in the Swedish economy since 1945. The next two sections deal with the policy of repressing inflation in the period 1945–50, and the associated controversy over full employment *versus* price stability, which has in a sense been the dominant theme in Swedish policy discussions throughout the post–war period. Section IV presents a general outline of stabilization policy from 1950 to 1966. The following three sections deal with some main policy issues and innovations in this period: the debate over the general principles of fiscal policy (particularly those of balancing the budget), new methods of influencing private investment for stabilization purposes, and the experience of monetary policy. Section VIII deals with long-term planning and resource allocation problems. The final section discusses current problems and policy tendencies.

## I. *Growth and Fluctuations in the Swedish Post–War Economy—*
## *A Bird's View*[2]

Compared to most other industrial countries, Sweden has experienced a relatively rapid and sustained rate of economic growth during the present century. In the period 1870–1950 Sweden probably had

---

[1] For a survey of some contributions to economic thought in Sweden before the mid-fifties see Landgren [68].

[2] The standard works on growth and fluctuations in the Swedish economy are Erik Lundberg's studies, particularly [87] [93] [95]. Other important documents are the official long-term reports [183]–[187] and the yearly national budgets [180] as well as the periodical reports about the economic situation by the "Konjunkturinstitut" (the National Institute of Economic Research) [181]. (The national budgets, which should not be confused with the government budgets, are analyses of the macro-economic development in terms of national accounts.)

the most rapid economic growth rate per head of population in the world.[3] One explanation, applying to the period after 1913, is presumably that Sweden was spared the two World Wars; another was that the depression in the thirties came rather late to Sweden, and that the Swedish economy recovered relatively rapidly from it.

Since the second world war the growth rate in Sweden has been about the same as the OECD average (excluding Japan), for the period as a whole, in spite of a relatively low growth rate in the fifties (Chart 1A). Whereas *total* GNP during the period 1950–65 rose a little more slowly in Sweden than the OECD average (excluding Japan), 4.0 per cent per year compared to 4.2 per cent, the *per capita* growth rate was in fact somewhat faster, 3.3 per cent compared to 2.9 per cent (OECD Statistics).

Before World War II, business fluctuations in Sweden followed the same general pattern as in most other industrialized countries, though the amplitude of the fluctuations was somewhat smaller than in many other countries. In the post–war period, the instability problem has changed character, in Sweden as elsewhere. Instead of violent fluctuations up and down in the level of aggregate production (GNP), the instability has consisted mainly of variations in the rate of growth, in the rate of inflation, in the degree of "full employment" and in the levels of production in particular sectors of the economy (Charts 1–3).

As before the second world war, exports has been a leading series in the business cycle—with respect to timing as well as to amplitude (Chart 1C). The time pattern of private investment has been more complicated, probably due to the influence of economic policy. However, the amplitude of the fluctuations has been considerable also for private investment; the same is true for investment in housing and the public sector (Chart 2A).

If GNP is disaggregated further, the instability of the components is still more pronounced. Thus, considerable fluctuations in production have taken place in key sectors such as pulp, paper, mining, iron and steel, engineering, housebuilding and public expenditure on goods and services. In fact, the Swedish economy seems to have been hit by stronger cyclical "disturbances" than most other industrial countries [93, pp. 148–54] [95, ch. 3, 5]. The stabilizing properties of the economy—presence of "shock absorbers," including the effects of stabilization policy—seem to be rather strong, however, as the disturbances

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[3] According to Angus Maddison [100, p. 30], the growth rate per head of population was 2.3 per cent per year in Sweden during the period 1870–1913 (as compared to 1.6 per cent for the average of industrial OECD countries, excluding Japan). During the period 1913–1950 the rate was, according to the same source, 1.6 per cent (as compared to 1.1 per cent for the OECD average, excluding Japan). For similar figures see Simon Kuznets [67, p. 10]. All figures refer to GNP per head in constant prices.

Change per year %  Chart 1·A

20 —

15 —

GNP prices

GNP OECD ( excluding Japan)
five year averages

GNP Sweden

10 —

5 —

0 —

1947    −50    −55    −60    −65    Year

Change per year %    Chart I   B

20 —

Labor costs[1](adult workers)

10 —

Consumer  prices

0 —

1947    −50    −55    −60    Year

Change per year %    Chart 1  C

30 —

20 —

Export volume of goods

10 —

0 —

Total gross fixed investment

−10 —

1947    −50    −55    −60    −65    Year
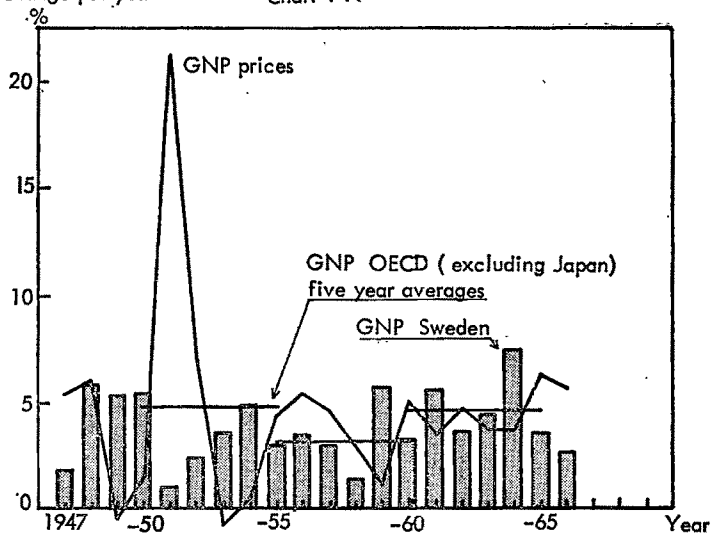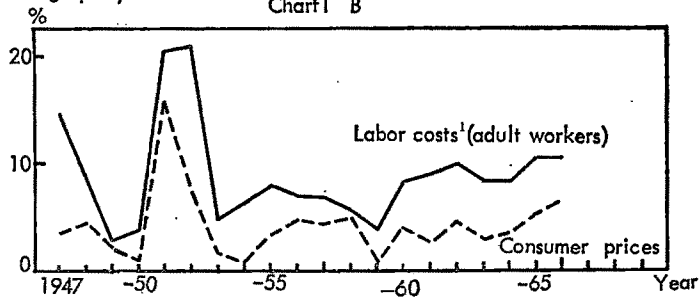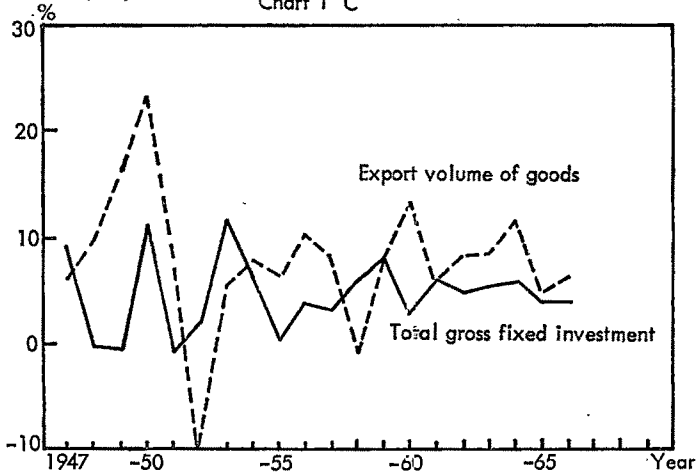
CHART 1

[1] Wages and indirect labor costs per labor hour.

## Chart 2 A

Change per year
%



A = Private gross investment excluding dwellings

B = Public gross investment excluding dwellings

C = Dwellings

## Chart 2 B

Billion
Sw. crowns

A = Value of imports (c.i.f.)

B = Value of exports of goods (f.o.b.) +
net export value of services

C = Exchange reserves (end of year)
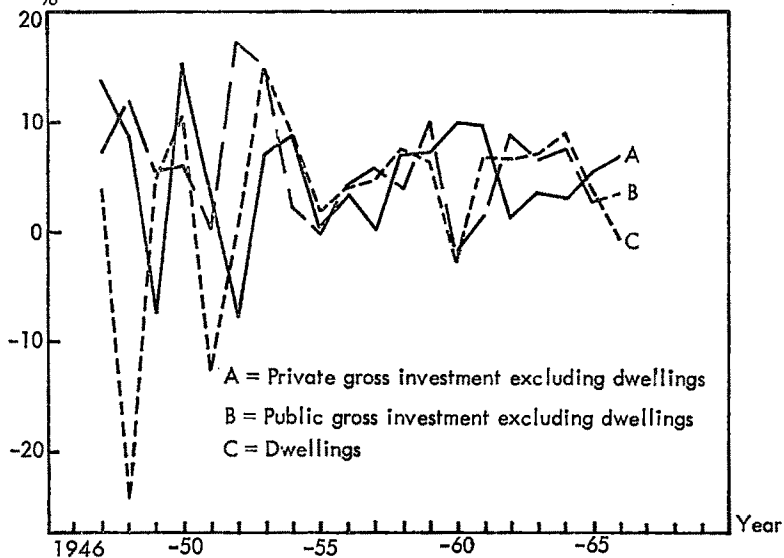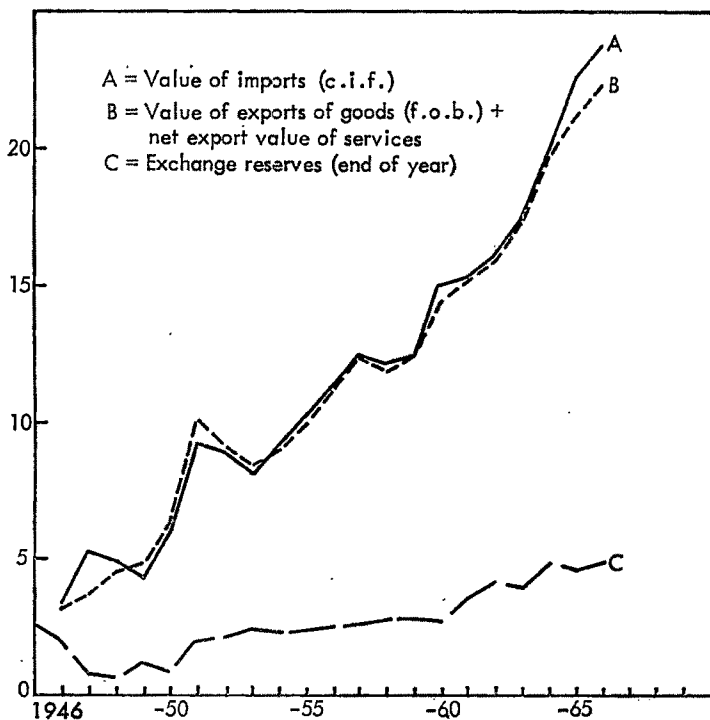
CHART 2

COMMENT: If statistical errors were removed, the current balance would show an accumulated surplus since the early Fifties.

Chart 3 A

Chart 3 B

Unemployment %

A = Unemployment according to unemployment insurance statistics (before 1956 chained to labour union statistics)

B = Unemployment according to labour force investigations

C = B plus persons employed in public relief works

D = C plus persons on retraining
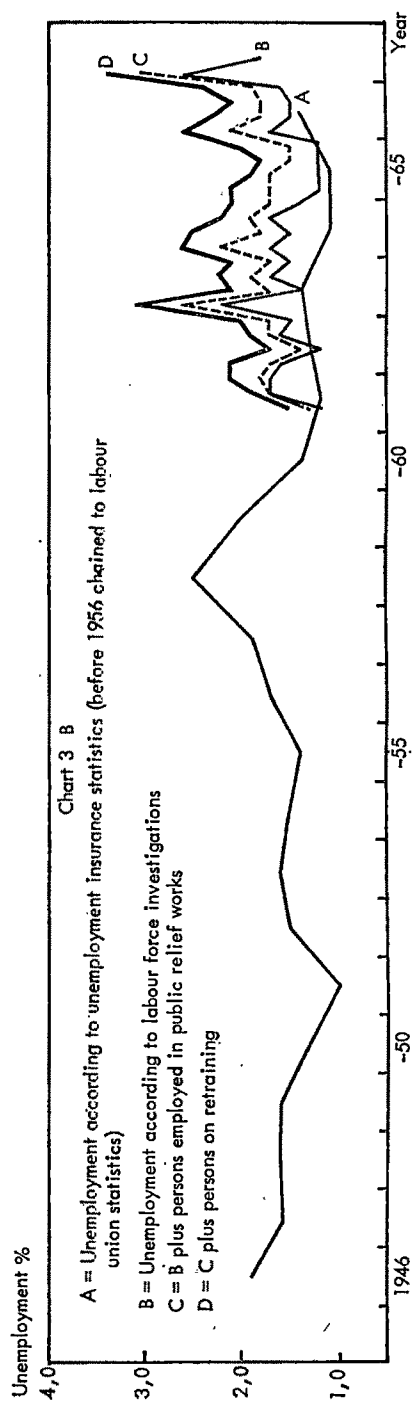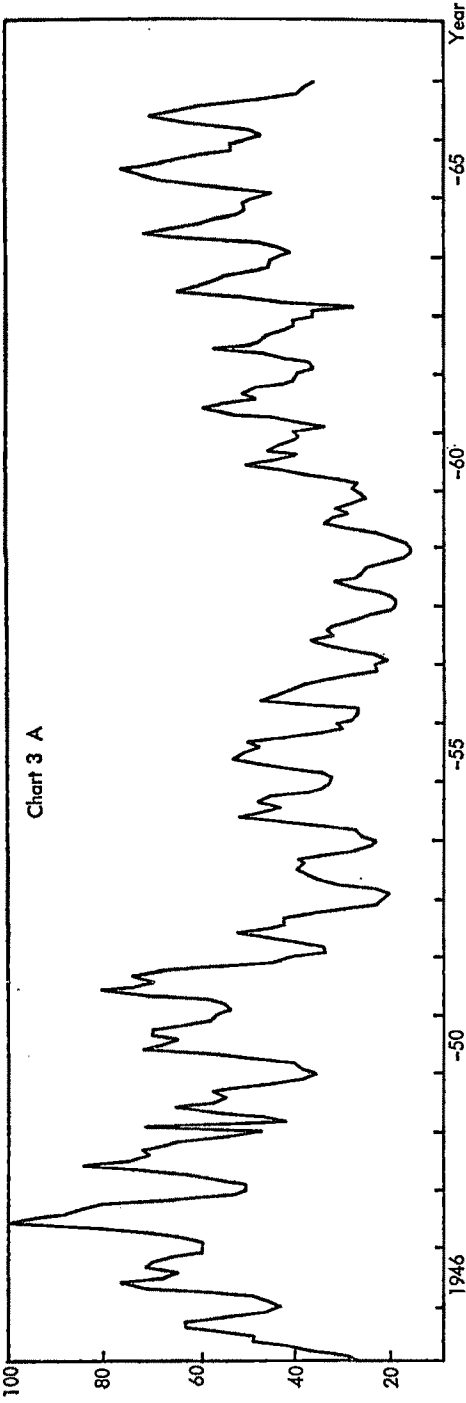
have never shown up markedly in the figures for aggregate production (GNP) and unemployment.[4]

The reason why GNP has been much more stable than its components is, of course, that the fluctuations in particular sectors have not been synchronized. When one or two key sectors have been on the way down, for instance engineering or the steel industry, other industries, such as pulp or paper, have been on the way up. Usually this behavior has been a reflection of international developments. This means that the diversification of the export sector has helped to dampen domestic fluctuations in aggregate production. Another factor that has stabilized the economy is that consumption has tended to rise quite steadily, rather independently of short–run fluctuations in national income [65, pp. 87–91].

It is also of interest to note that the amplitudes of the fluctuations in aggregate variables such as GNP and total investment (Chart 1) have become gradually smaller over time. Thus, there seems to be a tendency to a stabilization of "the first derivative of the time series" of these variables. The striking stabilization in recent years of the rate of change in total investment (Chart 1C) seems to result not merely from smaller fluctuations in exports and private investment but also, and above all, from contra-cyclical variations of investment in the public sector and housing since the middle of the fifties (Chart 2A).

In the recession periods, the monthly rate of unemployment has as a rule reached a maximum of 2–2.5 per cent, whereas in the boom periods the unemployment rate has been 1–1.5 per cent, as measured by

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[4] Erik Lundberg has tried to measure what he calls the short-term "shock absorption ability" of the Swedish economy (including the effects of economic policy) by adding the fluctuations in the various sectors (six sectors) in the economy numerically, the sum being denoted "gross disturbances," and comparing them with the actual "net" fluctuations, i.e., fluctuations in the aggregate (GNP). According to Lundberg's study, the ratio of gross disturbances to actual fluctuations in GNP is higher in Sweden than in any other industrial OECD country, indicating a relatively high "shock absorption ability" of the Swedish economy. Lundberg [93, pp. 153–54] [95, chapt. 3].

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*Sources to Charts 1–3*

GNP Sweden (1959 prices), GNP prices (implicit GNP price deflator), export volume, gross investment: Nationalräkenskaper. Consumer prices, unfilled vacancies, unemployment of union members (1945–55): Statistical Abstracts of Sweden. Labor costs before 1956 (workers of industry): The Employers' Association. Labor costs from 1956 (total economy): National Institute of Economic Research. Exports and imports (values): Handel, SOS. Net services: Riksbankens Årsbok. Exchange reserves (end of years): Riksbankens Årsbok. Unemployment according to labor union statistics (1945–55), unemployment insurance statistics (1956–66) and labor force studies, people in public relief works and retraining: Statistical Abstracts of Sweden and Meddelanden från Arbetsmarknadsstyrelsen. GNP, OECD: OECD Statistics.

unemployment insurance statistics. According to labor force studies, the unemployment figures are, on the average, about one half of a percentage point higher. If labor employed in public relief works, and the unemployed undergoing retraining programs organized by the Labor Market Board, are added, the figures for recent years have to be raised by about half a percentage point (Chart 3).

On the price side, the stability of the economy has been less pronounced, as is shown by the substantial price and wage increases that have occurred, particularly during boom periods (Chart 1). In the period after the Korean inflation, prices seem to have lagged behind quantities. The yearly rate of inflation in Sweden during 1950–65, measured by changes in consumer goods prices, has been about 4.3 per cent, as compared to 2.5 per cent for the OECD average—3.8 per cent for European OECD.[5] It seems as if the rate of change has tended to become stabilized also for price variables during the sixties—the rate of inflation for consumer goods at about 4 per cent per year and the rate of wage increase (including social security costs) at about 8–10 per cent (Chart 1B).

Another characteristic feature of the Swedish economy has been the strikingly parallel development of imports and exports. This observation holds both for long–term and short–term developments. As a result, Sweden has as a rule not experienced any balance of payment problems, even though the balance on current account has usually weakened during boom periods, particularly in 1947 and in 1965/66 (Chart 2B). In 1947, a year of substantial domestic excess demand for commodities, the deficit became so large that a balance of payment crisis did occur. The fairly substantial deficit in the current balance in 1965/66 has (so far) left the exchange reserves untouched, possibly due *inter alia* to a rise in short–term capital import (mainly trade credits).

This parallel fluctuation of imports and exports was also characteristic of the pre–World War II period. Erik Lundberg has attempted to explain the "good behavior" of the Swedish balance of trade during the business cycle by the favorable development of exports and by the hypothesis that the fluctuations in the Swedish economy are so much export–induced that imports and exports always tend to fluctuate in the same direction [92] [93, pp. 142–46]. As an explanation of the impressive development of Swedish exports, Lundberg has pointed out that the bulk of exports consists of products with a rather high income elasticity, and that the export markets, especially during the fifties, have been dominated by countries with high growth rates (Western

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[5] OECD Statistics. For the period 1945–65 the figure is 3.8 per cent for Sweden.

Europe). However, it is necessary to explain not only why exports have risen rapidly, and why imports have changed in the same direction as exports, but also why both have fluctuated by about the same amount in volume. In the context of a simple (presumably too simple) multiplier model for an open economy, this requires that the difference between the marginal propensities to save and to invest, the marginal propensity to "non–spend," be numerically small relative to the marginal propensity to import.[6]

Furthermore, no substantial changes in the terms–of–trade have occurred to disturb the balance of trade; part of the explanation of this is presumably that raw materials, the prices of which fluctuate more than other commodities, play about the same role on the export and the import side.[7] Moreover, short–term capital movements seem to have been stabilizing rather than destabilizing, in contrast for example to the experience of the United Kingdom. Short–term capital tends to flow into Sweden in periods of boom, excess demand and a deficit trade balance, which also tend to be periods of high interest rates in Sweden as compared to many other countries.[8]

In summary, it might be said that the Swedish economy during the post–war period has been an inflationary, high employment economy. In comparison with other industrial countries, Sweden seems to have been characterized by:

(1) a medium rate of growth (compared to OECD countries in general)
(2) large "gross" disturbances in exports and in private investment
(3) considerable fluctuations in production in particular sectors
(4) high stability in *aggregate* economic activity, as measured by GNP and employment
(5) aggregate production and employment most of the time close to full capacity for the economy as a whole
(6) a somewhat more than average rate of inflation during the period 1950–65 (compared to OECD countries in general)
(7) a striking stability in recent years in the *rate of change* of aggregate

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[6] If the autonomous change in exports is denoted by X, the induced change in imports will be $M = X \cdot m/(m + s)$, where m = the marginal propensity to import and s = the marginal propensity to save minus the marginal propensity to invest. Obviously M is approximately equal to X, if s is small relative to m.

[7] The net balance on current account has been rather close to zero most of the time; otherwise parallel fluctuations in export and import prices would have influenced the surplus (deficit) on current account.

[8] These short-term capital movements show up mainly in the "residual" item in the balance of payments, which partly consists of trade credit, for which capital movements are free. (However, a considerable part of the "residual" term is due to errors and omissions in the trade statistics. See Grassman [29]).

For a theoretical and empirical study of foreign trade credit, see Hansen [45].

variables such as GNP, total investment, and the general price and
wage levels

(8) a remarkably parallel development of imports and exports, both
in the long–term and short–term perspective

## II. *The Policy of Repressed Inflation 1945–50*

### A. *The Record*

The five first years after the second world war, 1945–50, represent
a rather distinct period for economic policy in Sweden. The experience
of this period has also been of great importance for the subsequent eco-
nomic policy debate. It is therefore worthwhile to discuss this period by
itself.

Except for the war years, when a coalition government was in office,
Sweden has had a Social Democratic government since 1932. When a
pure Social Democratic government succeeded the coalition government
at the end of the Second World War, two important documents con-
cerning post–war economic policy were published. One was issued by
a special government committee, the Commission for Post–War Eco-
nomic Planning [188], under the chairmanship of Gunnar Myrdal—
"The Myrdal Commission." The other document, the Labor Move-
ment's Post–War Programme [175], was issued jointly by the Social
Democratic Party and the Confederation of Trade Unions (LO).[9]

. Both programs focused mainly on the problem of keeping up aggre-
gate demand in the face of an expected post–war depression. The ex-
pectation of a worldwide depression, a common fear in many countries
at that time, was of course based on the belief that the post–war world
would be more peaceful than it turned out to be, and that the lesson of
how to guarantee full employment had not yet been learned by most
governments.[10]

Both programs favoured a successive removal of many direct con-
trols introduced during the wartime blockade: in particular the re-
moval of rationing of consumer goods, but also, at a later stage, the
removal of import control, licencing of building activity and government
control of wages. However, both programs argued that the government
should play a much more important role in the economy than it had
done before the war. This increase in the government's role should be
achieved by an expansion of the public sector as well as by energetic

[9] Among the economists in the secretariat of the Myrdal Commission were Karin Kock,
Richard Sterner and Ingvar Svennilon.

Ernst Wigforss, Secretary of the Treasury 1932–49, was the chairman of the labor move-
ment committee. Gunnar Myrdal was an expert consultant to this committee and Gösta
Rehn and Richard Sterner formed the secretariat.

[10] Gunnar Myrdal [118] in particular, was pessimistic about the ability of the American
government to prevent a major depression, with repercussions all over the world.

measures to influence the private sector. Thus it was argued in the labor program that the bulk of investment activity should be planned and conducted by public authorities and that foreign trade should be controlled by the state [175, pp. 22, 60]. However, it was not specified to what extent this conduct and control should be implemented by general economic policies and incentives and to what extent direct administrative measures would be necessary.

Even though the programs were characterized by a more interventionistic attitude than was policy in the inter–war period, they can hardly be characterized as socialist in the orthodox sense. Very little nationalization was proposed. It is true that there was a general statement in the labor program that the aim of the program was to "give the economy a new organization and to reshape society in a socialist direction." However, elsewhere in the program it was argued that, "to the extent that private enterprise succeeds . . . in giving the masses as much of the good in life as is technically possible at full and efficient use of labor and material factors of production, it can in the future be allowed to function in about the same way as was usual before the war" [175, p. 45]. In practice, nationalizations have been almost absent from Swedish post–war policy—the exceptions are the ownership of newly–built apartment houses, of which 80 per cent are owned by cooperative and public agencies (municipalities), the expansion of the public sector in the services field (electricity, schools, hospitals, etc.), and the establishment of some government–owned credit institutions. And in the mid-Fifties the state took over the 50 per cent of the shares of the Lapland iron ore fields not already state-owned.

In line with the conclusions in the post–war programs that many war–time regulations should be removed, rationing and import control were to a large extent abolished immediately after the war (in 1945–46). At the same time building restrictions were liberalized considerably. Only price control and the control of capital movements were substantially retained. However, even the retention of price control conformed to the recommendations of the Myrdal Commission and the Labor Movement Program, which had argued that it was not possible to rely on market forces to guarantee a desirable development of prices.

The official policy pursued by the authorities, the government as well as the central bank, was to bring about a reduction in prices in response to rising productivity and greater supply of inexpensive imported commodities (such as fuel). It was believed that part of the fall in the value of money during the war would thereby be recouped, and this was regarded as "fair" to savers (creditors). The belief that prices should be reduced in step with increases in productivity was a direct heritage from Davidson's well known norm for economic policy, ac-

cording to which prices should change in inverse proportion to productivity.[11] However, whereas Davidson's idea was designed primarily as a norm for monetary policy, the authorities believed that prices had to be brought down by administrative means. This belief was largely based on the assumption that prices, at least during a period of direct regulations and price control, were determined from the cost side, whereas demand was regarded as being less important. This hypothesis underlaid a number of policy measures in the immediate post–war period, such as the reduction of interest rates in February 1945, the appreciation of the Swedish krona (by 17%) in July 1946 and the abolition of the general sales tax from July 1947. (For a schematic picture of economic policy actions in the post–war period, see Chart 4 below.)

All these measures were introduced *inter alia* as means of reducing prices, or preventing price increases, via the effects on the cost side. This was particularly so for the appreciation of the Swedish krona, which was motivated to prevent international price increases, stimulated by the removal of price control in the US, from raising the Swedish price level. However, in the case of the abolition of the sales tax, political pressure from the opposition—lead by Bertil Ohlin,· head of the liberal party—was also an important explanation for the policy.

In principle, it is without doubt possible to fight price increases, or even to achieve price reductions, by measures which reduce production costs, such as interest rate reductions, appreciation and the reduction of indirect taxes. However, in a system with "market–determined" prices (equilibrium pricing) this requires that aggregate demand be sufficiently restrained, for example by higher income and profit taxation. Such actions were not undertaken to any significant extent, however. Another possibility might be to force down prices in conformity with the cost reductions by price control, direct controls over aggregate demand, and incomes policy. However, the direct controls had to a great extent been removed and price control was not very effective. Moreover, incomes policy at that time consisted mainly of general recommendations by the government to labor·unions to show "restraint" in wage demands; this did not prevent considerable wage increases—8 per cent in 1946 and 14 per cent in 1947 for industrial workers.

In the absence of both a constrictive general economic policy and

[11] Adherents to the Davidson norm included Erik Lindahl, Johan Åkerman, Dag Hammarskjöld and the Myrdal Commission. It was mainly Hammarskjöld, Undersecretary in the Treasury 1936–46, who incorporated the Davidson norm into economic policy documents. Davidson's norm was based on considerations of distribution as well as allocation. For an analysis of the theoretical discussion between Davidson, Wicksell and Lindhal see Bentzel [13]. The influence of this norm in policy in the early post-war years is discussed in Lundberg [87, pp. 127–31].

CONTRACTIVE ACTIONS 1)

EXPANSIONARY ACTIONS 1)

monetary policies

fiscal policies

economic conditions

fiscal policies

monetary policies

other measures

recession — 67
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selective investment tax
interest rate increases
investment funds stimulated
sales tax increased
pension fees raised
contractive budget policy
depositions to investment funds introduced
increased liquid asset ratios
sales tax introduced
increased liquid asset ratios
interest rate increases
loan ceilings
profit tax increased
depreciation rules stiffened
"voluntary" limitations of lending
investment tax introduced
liberalization of import
experiments with cash reserve requirements and liquid asset ratios
"sterilization" of certain profits
trade deficit
repressed inflation
temporary liberalization of import
appreciation

recession
trade deficit
expansionary budget policy
release of investment funds
interest rate reductions
reduced liquid asset ratios
location policy started
labor mobility policy strengthened
building control largely removed
loan ceiling removed
price control removed
building control liberalized
investment tax removed
building control liberalized
sales tax removed
devaluation
discount rate reduction
credits to foreign countries
reintroduction of import control
liberal building permits

1) In some cases, it is open to some discussion whether an action should be called "contractive" or "expansionary".

restrictive direct controls, economic policy did not succeed in its objectives. In combination with price control, the expansive monetary–fiscal policy resulted in a high excess demand for commodities and labor. The building market in particular was booming in 1946 and 1947, and encountered shortages of various factors of production, labor as well as building materials, with the result that construction times lengthened. Due to the decontrol of imports, the excess demand situation in the commodity market caused a deficit in the balance of trade. In contrast to a surplus on current account of about 1300 million kronor in 1945, a deficit of 118 millions appeared in 1946 and a deficit of close to 1500 million in 1947, resulting in a balance of payments crisis in 1947. Obviously, the trade balance could not withstand all the strains that were simultaneously put on it: the appreciation of the krona, the expansionary monetary and fiscal policies, the removal of a number of direct controls and the large wage increase. The strains on the balance of payments were accentuated by the grant of substantial government credits to a number of foreign countries, mainly the Scandinavian countries and the Soviet Union. It is also of interest to notice that in spite of price control, consumer goods prices rose by 8 per cent between mid-1945 and mid-1948.

Thus, the direct controls were too weak to make the expansionary (or passive) monetary–fiscal policy on the demand side harmless to the economy; the policy failed with respect both to prices and to the balance of payments. It is difficult to evaluate the relative importance of the different factors behind this expansionary (or passive) policy: incorrect forecasts about business conditions, poor economic theory or difficulties of a political–tactical nature. In any case, it took the authorities a very long time to adjust their policy to the fact that the main problem was inflation and balance of payments difficulties rather than unemployment.[12]

That inflation was the main problem many economists, businessmen and members of the political opposition had already been arguing in 1945–46. During the first post–war years, the National Institute of Economic Research, headed by Erik Lundberg, to a large extent built its analyses of the economic situation on calculations of (ex ante) excess demand gaps in the commodity markets—"inflationary gap calculations"—particularly after late 1946. These calculations were used both for an analysis of actual tendencies in the economy and for a discussion of alternative economic policy actions to restore macro–economic equilibrium. Such gap calculations later became the main tool of analysis also in the National Budgets, published twice a year by the government. This approach probably helped to focus the

[12] The pure political-tactical factors have been stressed by Torsten Gårdlund in particular [32].

economic policy debate on the demand side more than was earlier the case. The analytical technique employed in these studies has been successively improved—some of the main contributions being made by Erik Lundberg [84] [85], Ingvar Ohlsson [130], Börje Kragh [62] and Bent Hansen [39]. There seem to be two main theoretical roots to these developments—Keynes' *How to Pay for the War* and the *ex ante* analysis developed by "the Stockholm School" in the Thirties.[13]

In response to increasing prices and a worsening of the balance of payments, economic policy in 1947/48 retreated into direct controls, such as import regulations, stiffer control of building activity, and to some extent rationing. In the implementation of building regulations, investment in the export sector, and to some extent in the import–competing sector, was favoured, whereas housing, the service sector and the public sector were cut back. In particular, house–building was reduced by 22 per cent between 1947 and 1948. Hence, during the three–year period 1947–1949, Swedish economic policy became dominated by price controls and regulation of building and of imports, in combination with a still rather passive monetary and fiscal policy. This meant that direct controls were retained in Sweden for a rather long time after the war, after the temporary liberalization in 1945–46. As a consequence, the economy was characterized by a policy of "repressed inflation" during most of the forties.

## B. *The Criticism*

Considerable criticism was directed against the policy of repressed inflation—from the non–socialist opposition and the business world, as well as from a number of economists. Bertil Ohlin stated quite early in the post–war debate that the two policy goals of price stability and full employment in the Beveridge sense of "more jobs than men" (what Ohlin called "overemployment"), were more or less incompatible in a "free" market economy. Ohlin argued that attempts to reconcile them would easily lead to more and more detailed government regulations. He also argued that the continued effects of repressed and open inflation, in combination with direct controls, would in the long run impair the allocation of resources in the economy [128] [129].

Among academic economists outside politics, the policy of repressed inflation was criticized mainly on two grounds:
(1) its alleged inefficiency as a means to stabilize the economy
(2) its alleged unfavourable effects on the allocation of resources.

Some of the most noted critics among economists were Erik Lundberg and the labor union economists Gösta Rehn and Rudolf Meidner.
(1) The criticism by Rehn and Meidner dealt mainly with stabili-

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[13] The first gap-calculation was made in 1943 by the National Institute of Economic Research [182].

zation [102] [103] [135–136] [162] [178]. In particular, they argued
that a policy of repressed inflation was doomed to fail in its attempt to
stabilize labor cost. Unions could not resist pressure from their mem-
bers for considerable wage increases in a situation when profits were
high due to abundant demand for commodities; the bargaining position
of the union was "too" strong. At the same time, market-induced wage
drift occurred in response to excess demand for labor. According to
Meidner and Rehn, the advice of Beveridge and other economists that
labor unions should "exercise restraint and modesty" in their wage
claims was self–defeating in a labor market with permanent excess de-
mand ("more jobs than men"). As an instance, Rehn and Meidner
pointed to the experiences in 1949–50 when the labor unions accepted
a two–year prolongation of the earlier wage agreement. This "wage
freeze" was secured by a direct appeal from the government, which in
its turn promised to keep down price increases by price control and
subsidies. However, the "wage freeze" did not prevent wage drift for
certain groups and this created claims for "compensation" from other
groups later on. According to Meidner and Rehn, dissatisfaction
created during such periods of wage restraint tends to result in "wage
explosions" sooner or later; in fact such an explosion seemed to have
happened in 1951 and 1952 in connection with the Korean inflation
(see Chart 1B). A similar, though smaller, "wage explosion" occurred
in 1947, after a period of wage restraints. Working as they were inside
the labor unions, Meidner and Rehn had also been impressed by the
difficult position that union leaders and functionaries are faced with
when the traditional role of the unions to press for wage raises is re-
placed by the objective of attempting to dampen wage increases. Now
Rehn and Meidner meant that the responsibility to dampen wage in-
creases should be switched back to employers by a policy that made it
less easy for them to foist increased wage costs onto the consumers.

Thus, the attempts in the late forties to pursue an "incomes policy"
via voluntary agreements between labor and employer organizations
did not work very well. An explanation might be that incomes policy at
this time was implemented in an economy of repressed inflation. In-
comes policy became a *substitute* rather than a complement to a gen-
eral, restrictive economic policy. Hence, the experiences of this period
may not indicate much about the possibilities for success of an incomes
policy supported by a restrictive general economic policy.

Erik Lundberg, too, stressed the difficulties of preventing "excessive"
wage increases in an economy with permanent excess demand for com-
modities and labor [87, ch. X–XII]. Lundberg argued in addition
that direct control often work with very long time–lags and with
rather uncertain quantitative impact, e.g. that it took over one year be-

fore the import controls of 1947 became effective. He also pointed out that the system of building licences implied a control only of building starts but not of building activity. The effects on the latter depend also on how rapidly the projects are completed. Moreover, there was, according to Lundberg, a tendency for business firms, to "underestimate" the costs of building when they applied for licences, with the result that the expenditure tended to be higher than expected by the authorities. According to a study by Lars Lindberger, the volume of gross investment in industrial building and other construction amounted over a series of years to more than twice the value of the building permits granted to the enterprises involved [82, pp. 120–24].

(2) Meidner, Rehn and Lundberg also criticized the policy on allocation grounds. The most penetrating analysis and criticism on this score was undoubtedly that delivered by Lundberg, whose discussion of these issues is still one of the most systematic analyses available in the international literature [87, ch. XI–XII]. His basic line of argument was to show how various types of inefficiency and misallocation of resources developed as a result of direct controls in an economy with repressed inflation. In particular, Lundberg analyzed the effects of import control, building control and price control. He supported his theoretical analysis by a questionnaire study, which gave numerous examples of the effects he was discussing.[14] The statistical representativeness of the study is somewhat uncertain, however, because of a rather small frequency of answers to the questions.

In the case of import control, Lundberg stressed the risk of a reduction in competition among importers and therefore also among domestic producers. One reason was that new initiatives were jeopardized by the fact that quotas were usually determined on an historical basis. The system of building licences was criticized mainly on the ground that it was extremely difficult for the authorities to find economically rational criteria for the allocation of permits between sectors and firms. In 1947–49 the controls were geared to promote export industries, and to some extent import–competing industries, for the purpose of solving the acute balance of payments problem. However, the administrators also seemed to be caught by "physiocratic" and "mercantilistic" ideas that production of commodities, mainly exports, was more "productive" than distribution and other services in the home market. The concentration on export industries and import–competing industries was also due to the fact that the administrators tended to look only at the *direct* effect on the allocation of resources, neglecting the more complicated indirect effects. This meant, Lundberg argued, that no consideration

[14] Appendix to Swedish edition of [87].

was given to the fact that high profitability investments in the service sector might release resources which could be used in other parts of the economy and in that way promote exports. According to Lundberg, increases in the production of exports brought about in this indirect way could in many cases be several times larger than the effects of direct discrimination in favor of certain export industries. As Lundberg pointed out, such indirect effects via the price system are more or less automatically taken into account via the market mechanism in a system without price controls and direct regulations.

Another typical thesis of Lundberg's was that criteria for direct intervention were destroyed by the regulations themselves, mainly by the price control. One of Lundberg's characteristic formulations was, "the dilemma of the regulated economy lies in the very fact that although prices have been to a large extent divorced from their function of regulating economic activity, the evidence of prices is nevertheless used as the basis for the evaluation of the effects of the regulations" [87, p. 312]. Lundberg also emphasized the dynamic role of prices and profits in the economy, reallocating resources in response to changes in technology, taste and foreign demand. Thus, he was critical of attempts to keep prices at some assumed long–term equilibrium level by price control, thereby eliminating the price and profit fluctuations which in a market economy are necessary as incentives to reallocate resources.[15] In his criticism of price control, Lundberg and other critics of course also pointed out other well known effects of such controls, such as the development of black markets and the tendency of producers to shift over from standard articles, where price control is simple, to more differentiated products where price control is difficult.

### III. *The Controversy about Full Employment and Price Stability*

The Swedish economy reached a level of full, or overfull, employment by the second half of the Forties (see Chart 3). The difficulties which thereupon emerged—of combining full employment with stable prices—resulted in an animated debate among economists. For instance, Bertil Ohlin argued, from the early post–war period on, for more reliance on general economic policy methods instead of direct controls. However, Ohlin appears to have seen no other solution to the

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[15] See e.g. the following passage in Lundberg, "If the dynamics of economic expansion are examined from this point of view, a highly effective price control appears dangerous. If price controls really succeed in bringing about an immediate or very rapid adjustment of prices to the changed cost conditions, with the result that abnormally high profits—or even profit expectations—at various points never appear, certainly one criterion of equilibrium in the price system would eventually be fulfilled [prices being equal to average costs], but the corresponding adjustment of production and investment would fail to come about in due course of time." [87, pp. 317–18].

conflict between full employment and stable prices than to reduce aspirations with respect to the employment level.[16] He believed that such a reduction would not necessarily be detrimental from a welfare point of view, since a lower employment level in his opinion might result in a higher national income due to the elimination of distorting tendencies in the labor market.[17] Ohlin also argued that the "necessary" reduction in the employment level could be rather limited if labor mobility was increased and if a "skillful adaptation of public works to local surpluses of labor" was achieved [129, pp. 5–6]. This idea, later developed by Gösta Rehn had in fact been suggested by Ohlin as early as 1936 [125, pp. 119, 195, 203–6] and by the Myrdal Commission in 1944 [188]. The tradition in Sweden of emphasizing labor mobility is even older than that; Gösta Bagge in his thorough analysis in 1917 of the causes and consequences of immobility of labor stressed the possibility of reducing unemployment via greater mobility of labor [11, ch. V–VI, particularly pp. 357–85]. Ohlin believed that if ambitions concerning the level of employment were modified somewhat, a more liberal economic policy could be pursued. In particular Ohlin argued energetically for a liberalization of international trade. However, he also suggested "round-table conferences" between government, opposition, industry, agriculture and labor to try to reach agreements about stabilization policy and about moderation in the struggle over income shares.

Myrdal too asserted, in a couple of articles published at the beginning of the Fifties, that direct controls and repressed inflation would not be successful in the long run in combating price increases. Instead of a "guerilla war" against price movements, in a situation of excess demand, Myrdal argued for more reliance on general economic policy methods, mainly fiscal policy, designed to restore macro–economic equilibrium. Myrdal on this occasion also stressed the inconveniences created for individuals by detailed regulation of their economic life [119]. However, the theories and proposals presented by Gösta Rehn in 1947–49 came to play a particularly important role in the debate about full employment and price stability [135] [136] [162]. The starting–point for Rehn's analysis was that full employment can be

[16] Compare the following passage by Ohlin: "It is true that immediately after the war nobody quite understood how large the disadvantages of overfull employment would be and how important it was to try instead to achieve a high and stable employment of the type of good years in the pre-war period" [128]. In another publication Ohlin talked about 94–97 per cent employment as a reasonable degree of full employment, compatible with price stability [129, p. 5].

[17] It is also of interest to note that Ohlin wanted to define "full employment" as a situation without excess demand for domestically produced *commodities*, rather than as a particular situation in the labor market; this definition would formally imply less of a conflict between full employment and price stability [129, p. 5].

achieved in two different ways. One way, criticized by Rehn, is to keep
a very high level of aggregate demand, so high that full employment
will exist even in the weakest sectors of the economy. As a result, ex-
cess demand for labor would prevail in several sectors of the economy
—"more jobs than men" à la Beveridge. An alternative road to full em-
ployment, advocated by Rehn, was a general, restrictive economic pol-
icy, combined with "positive", i.e. expansionary, selective job-creating
measures to remove tendencies to unemployment in the weakest sectors
of the economy.

Thus, according to Rehn, a general restrictive economic policy was
necessary, but not sufficient, to guarantee both price stability and full
employment. Rehn wanted to push restrictive fiscal policy hard enough
to create some depressive tendencies in the economy. But to prevent this
from resulting in considerable unemployment, Rehn proposed a vigor-
ous labor market policy, with retraining programs and compensation to
labor for moving from one job to another. Thus, the tendencies to un-
employment should be fought directly on the spots where unemploy-
ment arose, instead of keeping up the employment level by an expan-
sive general policy on the demand side. Rehn's policy proposals to fight
unemployment "on the spot" also included policy measures to stimulate
the establishment and expansion of firms in areas with unemployment.
According to Rehn, "some subsidization of marginal firms may also be
necessary" [162, p. 50]. Rehn argued that with his policy the total
level of unemployment would in fact be lower than with a policy of re-
pressed inflation [136, p. 62] [162, pp. 72–73]. Thus, Rehn's pro-
posals—partly anticipated by Ohlin and the Myrdal Commission—may
be characterized as an early discussion of problems which have later
been formalized by the Phillips curve concept, and as an attempt to
outline a number of labor policy reforms designed to shift the Phillips
curve downwards.

A basic concept of Rehn's program was that profits should be
squeezed between restrictive fiscal measures, preferably indirect taxes,
and rising wages. One of the main purposes was to remove excess de-
mand for labor in most sectors of the labor market, whereby
market-induced wage drift could be avoided. Low (average) profits
were, in Rehn's opinion, also necessary, if the labor unions were not to
be provoked to demand high wage increases in the bargaining process.

Another characteristic feature of Rehn's proposals was that the labor
unions should rely on a wage policy based on "the solidarity principle,"
implying that the labor unions in sectors with low wages and profits
should not hesitate to push for as high wages as those prevailing in
other sectors. As Rehn recognized, a policy of that kind requires rather
centralized decision-making on the union side; such centralization was

advocated also by Meidner. Rehn and Meidner thought that the rivalry among unions about their "fair shares" could be dampened by this centralization. In their view, labor unions should not accept a differentiation of wages between industries in accordance with the profit situation, because a general wage inflation could easily occur if wage differentials were accepted as a means of reallocating labor, as a result of claims to restore the initial wage relationships from groups with smaller wage increases than the average. (However, they accepted wage differentials *within* industries due to differences in skill.) Instead of reallocating the labor force by pulling it by promises of higher wages, the labor force should be pushed out of weak sectors, by contraction of production and by business failures, and be helped over to other sectors by the labor mobility policy. Rehn argued that this policy not only would reconcile full employment and price stability, but also speed up reallocations of resources, and hence be desirable for economic growth.

Thus Rehn proposed a system in which the unions should follow a "solidaric wage policy," and in which the *government* should pay people to move to new jobs. The payments to unemployed labor for moving would have a double function: to stimulate people to move and to compensate them for the welfare losses they suffered in the interest of the economy as a whole. The latter function recalls the compensation payments in connection with reallocation of resources à la Kaldor and Scitovsky, proposed in theoretical welfare economics to extend the applicability of the Pareto criteria. Rehn's proposals were to a large extent incorporated in the economic policy program of the Swedish Confederation of Trade Unions (LO) in 1951 [178] and later (in 1961) in the report by a public committee on stabilization policy [193].

The main criticism of Rehn's proposals by economists came from Erik Lundberg and Bent Hansen. However, two of Rehn's basic ideas have been generally accepted:

(1) that price stability is difficult to achieve if general excess demand for commodities and labor is not avoided and
(2) that the possibility of reconciling full employment and price stability is enhanced if the mobility of the factors of production is increased by a vigorous labor mobility policy.

Lundberg criticized Rehn on both theoretical and political grounds. With respect to theory, Lundberg was skeptical about Rehn's belief that wage increases would necessarily be dampened by keeping average profits low if at the same time the unemployment level was as low as in Rehn's proposals, and the profits of marginal firms in some cases were maintained by subsidies. Instead of Rehn's hypothesis that wage increases depended mainly on the average profit level in a sector, Lund-

berg argued that the size of wage increases mainly depends on aggre-
gate labor demand and on the profits of *marginal* firms, in line with tra-
ditional marginalist theory. Thus, Lundberg was inclined to deny that a
situation with high (average) profits and great profit differentials
would result in greater wage increases than would occur in Rehn's sys-
tem where the average profit level for firms was lower but where unem-
ployment was smaller and marginal firms in some cases would be
subsidized.[18]

Lundberg also argued that the levelling of wages and to some extent
also profits, implied in Rehn's program, would be detrimental to an ef-
ficient allocation of resources. Selective job–creating actions by the
government, particularly subsidies to marginal firms (which did *not*
play a major role in Rehn's program, however) may hamper a rapid
reallocation of resources. In Lundberg's opinion Rehn had misjudged
the dynamic aspects of allocation of resources, for instance the impor-
tance of profit differentials for such reallocations. Lundberg also be-
lieved, contrary to Rehn, that some wage differentials were important as
incentives for labor to move to expanding sectors.

Looking at this controversy in retrospect, it seems obvious that there
is a risk of a conflict between stabilization and allocation aspects in
Rehn's program. Whereas labor mobility policy à la Rehn presumably
is favorable both from the point of view of stabilization and allocation,
selective measures to stimulate economic activity in unemployment
areas may, in the long run, easily be detrimental to an efficient alloca-
tion of resources for the economy as a whole.[19] However, it has to be
added that the wage policy proposed by Rehn, based on "the solidarity
principle," would remove present "subsidies" to firms in the form of
low wages for low–profit firms; thus the proposed wage policy would
force many low–profit firms to close down. The net effects of these op-
posing tendencies cannot be determined on theoretical grounds. More-
over, Rehn's proposal should be seen in its historical context of an
economy with direct controls and repressed inflation, with the "alloca-
tion distortions" connected with such a system.

Another difference of opinion about policy was that Lundberg argued
for monetary policy whereas Rehn mainly argued for fiscal actions. It
should be noticed that Lundberg's plea for a larger share for monetary
policy was made against the background of the very passive monetary
policy in the previous period. One of Lundberg's arguments was that

[18] The influence of average-profits on wage increases is still an open question. In an
econometric study, Hansen and Rehn found a strong (positive) relation between excess
demand for labor and wage increases, but no relation between profits and wage increases.
However, they used a rather unsatisfactory statistical representation of profits [46].

[19] It would seem that Rehn, in his early proposals, was hardly aware of this problem:
"The way in which new jobs are created is a secondary question" [162, p. 49].

monetary policy was a much more flexible tool than fiscal policy, as it could be reversed practically "overnight."

There was also an ideological difference in opinion between Rehn and Lundberg. One of the reasons why Rehn favored fiscal policy was that he wanted to transform a substantial part of business saving into government saving, in order to alter the distribution of wealth between the private and public sector. Rehn also saw fiscal and labor market policies as methods by which the government could achieve a closer control of the economy, and push the economic system in a "socialist direction," in spite of removals of direct controls. In fact, the difficulties created for firms by a very contractive fiscal policy would, in Rehn's opinion, open the way for powerful "positive" employment— creating interventions in the economy by the government. Lundberg, on the other hand, argued instead that government interventions should be kept at the minimum required to guarantee price stability and a high employment level. One reason for his recommendation of monetary policy obviously was that he regarded this method as more "general," and hence less "interventionistic," then fiscal actions. Moreover, he argued that large scale redistribution of wealth and selective government interventions to create new jobs, as suggested by Rehn, would lead to an "undesirable" concentration of power in the public sector.

Lundberg's alternative to Rehn's proposal was a flexible general economic policy, mainly implemented by monetary measures, and a "lower level of full employment" than in the Forties, somewhat similar to Ohlin's proposals. One basic difference between Rehn's and Lundberg's proposals was that whereas Lundberg argued for a *flexible* general economic policy, Rehn argued for a *permanently* restrictive general economic (fiscal) policy; finer, short–run adjustment should in Rehn's system be made through labor market policy and the stimulation of economic activity in particular sectors hit by unemployment.

Bent Hansen mainly criticized Rehn's proposal of a wage policy based on the "solidarity principle," which according to Hansen would result in unnecessarily great unemployment in the weak industries [43]. For instance, this kind of wage policy might make it impossible for many firms to survive periods of temporarily low profitability. Rehn's policy could also, according to Hansen, lead to rather inefficient movements of the labor force from one industry to another and back again, which in some cases would be unnecessary if a more flexible and differentiated wage structure was allowed to develop. Furthermore, Hansen could not understand why the labor force should not be allowed to choose for itself whether to stay in the present industry or region at low wages or to move to other industries or regions in order to get higher wages. Thus, Rehn and Hansen obviously used different so-

cial preference functions. Rehn seemed to have in mind a preference function in which GNP should be maximized, whereas Hansen's social preference function seemed to include also the valuation by employees of different kinds of jobs. In Hansen's view it was obviously regarded as advantageous to economic welfare to allow a wage earner to abstain from a given increase of money income in order to remain in his old profession, industry or region.

This criticism by Hansen is based on the assumption that a solidarity–oriented wage policy will in fact be successful. Such success is not self-evidently probable, however. Attempts to raise the wages of low income groups in a full employment society may easily be accompanied by wage drift for groups with higher wages, so that the attempt to change the wage structure would fail. The result would instead be cost inflation. The empirical evidence of the last fifteen years indicates that something like this has happened.

Hansen also questioned the desirability of squeezing profit level between rising wages and restricted demand, on the grounds that such a policy might conflict with the objective of maintaining business saving and the investment ratio in the economy. Hansen also argued that *if* a reduction of profits was desired, on distributional grounds or to reduce claims for wage increases, this could as well be done by higher profit taxation. (In this case subsidies to marginal firms would not be necessary to prevent unemployment.) [41, ch. XVII].

Hansen also outlined positive suggestions for solving the conflict between full employment and price stability. First of all, he argued for institutional rearrangements in the labor market designed to make the bargaining process less inflationary—for instance by changing the timing of wage negotiations so that they would fit better into the process of political decision–making, and particularly into the time–table of budget decisions. He also questioned the extensive use of price rates in Swedish industry. A retreat from efforts to pursue a solidarity–oriented wage policy could in his opinion also contribute to a less inflationary labor market [43]. Hansen's main contribution to the debate was, however:

   (a)  a method by which the government could induce employees to accept a wage change consistent with price stability, and
   (b)  a method to eliminate the price effects of an "excessive" wage increase that had already occurred [41, ch. XVII].

Hansen's idea was that the government should use its power over the distribution of income (after taxes) to influence wage changes. In Hansen's plan the government should make a decision about the desirable wage increase in the light of expected productivity increases. After

that, the government should make public that it wanted the bargaining to wind up by accepting this wage increase. More specifically, the government should declare that if the wage increase was exactly as large, on the average, as the government wanted, the government would allow the wage–earners to enjoy the resulting increase in disposable real income. If the wage increase were larger, the government would increase taxes in such a way that the increase in real disposable income for wage–earners would actually be lower than if the labor unions had accepted the advice of the government.

If, however, wage increases nevertheless became excessive in relation to productivity increases, Hansen proposed a method to eliminate the effects on market prices, without giving up the full employment goal. This method involved a combination of reduced indirect and increased direct taxes. The reduction of indirect taxes (or increase in general indirect subsidies) would eliminate the cost effect of the "excessive" wage increase (in excess of productivity increase), whereas the increase in direct taxes would eliminate the demand–increasing effect of the wage rise. (To make this policy compatible with the threat of the authorities to change the income distribution adversely to labor in this case, the changes in taxation must be disfavorable to labor.) From this point of view, it would have been quite correct to fight price increases in the forties by low interest rates, appreciation and sales tax reductions— *if* at the same time aggregate demand had been cut back by other means, such as direct income and profit taxation.

Hansen also pointed out that there is in general no wage increase that will by itself create equilibrium both on the commodity market and on the labor market. Thus some other economic policy actions will always be necessary to guarantee that given increases in productivity and wages would lead to equilibrium in both the labor market and the commodity market. In this analysis Hansen developed ideas which he had expressed in his earlier work *The Theory of Inflation*, where he analyzed the interaction of the factor market and the commodity market in a situation of repressed and open inflation [39]. Hansen's analysis here may be regarded as an extension of Wicksell's cumulative process, particularly as formulated in an article by Wicksell in 1925 [172], in which the process of rising prices and wages was assumed to start from a situation of excess demand for commodities, without emphasis on the difference between the natural and market rate of interest as the driving force. In fact, this analysis by Wicksell is very similar to Smithies' well known analysis of demand inflation using the Keynesian 45° diagram [143]. Wicksell showed how a price rise, caused by excess demand for commodities, continued when income receivers obtained higher income via higher prices. As increased purchasing power was

created by the price increase itself, the process did not necessarily lead to a new equilibrium position. As Wicksell pointed out, the price increases will only stop when income receivers revise their spending plans by reducing real demand to the full capacity supply of commodities.

One of Bent Hansen's contributions in his theory of inflation was to show explicitly how the interaction between the commodity and factor market functions in such a process, and how a quasi–equilibrium of parallel rises of wages and prices might occur. For this purpose Bent Hansen developed his nowadays well known diagram in which the state of demand in the two markets is depicted simultaneously [39, ch. VII]. In this analysis Hansen distinguished carefully between inflationary gaps in the commodity market and excess demand gaps for factors of production—"factor gaps." The signs of these gaps could very well differ in many situations, depending on the real wage rate. By using the same model Hansen also developed a theory of repressed inflation in a system with price control.

Hansen's proposed policies for reconciling full employment and price stability can be criticized on a number of grounds. As Hansen has pointed out himself, an upward drift of the average wage level might be difficult to avoid in a labor market which is heterogeneous, in the sense that there may be excess demand in some submarkets at the same time as there is excess supply in other submarkets. Stability of the average wage level would in this case require that wage decreases in the latter submarkets fully compensate for wage increases in the former. As wages are sticky downwards, stability of the average wage level is therefore difficult to achieve even if *autonomous* wage increases, i.e. increases not caused by excess demand for labor, could be avoided. (However, due to continuous productivity increases price stability does not require a stable wage level.)

Another criticism is that Hansen overestimates the authorities' ability to determine the after–tax distribution of income between profits and wages, as well as between different wage–earner groups. Obviously, the general income tax might not be very appropriate for this purpose as there is no close correlation between income bracket and status as employer and employee, nor between union membership and wage level.[20] It has also been argued that to succeed, Hansen's policy would require very skilled and brave politicians. However, this criticism can be directed against any proposal for solving difficult economic policy problems—otherwise they would not be "difficult."

Another proposal to reconcile full employment with price stability was made by Anders Östlind [174]. Östlind's idea was to allow relative

[20] These points have been stressed by Lindbeck [74].

wages to be determined by negotiated agreements, but to have the government assume responsibility for determining the average wage increase. Specifically the organizations in the labor market would be allowed to bargain about wages, but the government would have the power to reduce all wages afterwards by a given coefficient which would be the same for all employees—a kind of guide-post policy "with teeth." Like the proposals by Rehn, Lundberg and Hansen, Östlind's suggestion is interesting *inter alia* in showing how difficult it is to guarantee price stability in a society which wants to avoid both unemployment and centralized government intervention in wage determination.

### IV. *Stabilization Policy 1950–66—General Outline*

The policy of repressed inflation was followed by a period of rapid open inflation in 1950–52, initiated mainly by international price increases in connection with the Korean war. The open inflation occurred in spite of the fact that most direct controls, such as building and price control, were still in operation. Immediately before, in 1949, the government had tried to prevent price increases abroad from influencing the domestic price level, *inter alia* for the purpose of supporting the incomes policy of the organizations in the labor market. One technique was the use of subsidies to counteract the effects on domestic prices of the increase in import prices when Sweden, following Great Britain, devalued the krona in the autumn of 1949. However, this policy was given up entirely when the Korean war in 1950 inflated world market prices, particularly for raw materials, which at that time played a considerable role in Swedish foreign trade both on the export and the import side.

The most important economic policy decision of the government at this time was no doubt the decision *not* to appreciate the Swedish krona; this would have been necessary in order to isolate the Swedish price level from the violent price increases in the world market. Instead the Swedish government declared, in contrast to the policy in 1946, that an adjustment to international price increases was necessary—a so-called "once-and-for-all inflation"—and that full employment would be guaranteed by an expansion of aggregate demand (in money terms) in line with the domestic increase in production costs.

The Korean inflation had a considerable impact on the economic policy debate in Sweden. Bengt Metelius and The National Institute of Economic Research analyzed "vertical" and "horizontal" spreading of price increases within the Swedish economy in response to price impulses from abroad [105, ch. 4]. (The same problem had been analyzed theoretically by Hammarskjöld in the thirties [33].) The Korean inflation made it clear that isolation of the economy from foreign price

influences would require a flexible exchange rate policy. There was a detailed analysis by Bengt Metelius of how such a policy would be implemented, and supported by other policy actions, in a situation when export and import prices increased at quite different speeds [105, ch. 9]. Bent Hansen showed that policy tools other than exchange rates were necessary to guarantee equilibrium in the balance of payments if the exchange rate was used to isolate domestic markets from price fluctuations abroad [41, ch. XVIII].

During the Korean inflation wage–earners tried to get compensation not only for the price increases that had already occurred, but also for the price increases which they expected as a result of their own wage increase. This was one of the reasons why the rate of inflation accompanying the Korean war became so much more rapid in Sweden than in many other countries—21 and 7 per cent in 1951 and 1952, respectively, for the GNP deflator.[21]

After the Korean war, economic policy was considerably liberalized, in the sense that direct controls were gradually replaced by general fiscal and monetary policy. (See Chart 4.) One important step in this direction had already been taken in 1949, and was carried much further in 1952 and 1954, through the successive liberalizations of foreign trade, initiated mainly by the activities of OEEC. This policy was greatly facilitated of course, by the creation of the European Payments Union, which made bilateral balancing of trade no longer necessary.

Another important step in the liberalization of economic policy was the gradual abolition, during the late Fifties, of the licensing control over building. In fact this had been proposed already in 1951 by the Building Control Committee, of which Erik Lundberg was a member and Lars Lindberger the secretary [191]. A certain control of the *timing* of building starts was retained, however, through the requirement of permits for building starts from local labor market authorities, the permits being issued on the basis of the local availability of building

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[21] Lundberg in his analysis of the inflation process [87] constructed a "wage multiplier," expressing the size of wage increases that are expected to follow as a consequence of the wage increase itself—the process constituting an infinite geometric series. Denoting the marginal and average tax rate by $t_m$ and $t_a$ respectively, and the ratio between the induced (relative) price increase and the (relative) autonomous wage increase by k, Lundberg's wage multiplier was written

$$\frac{1}{\dfrac{1 - t_m}{1 - t_a} - k}$$

It expresses how much larger than the initial price rise the wage rise must be in order to provide "full compensation" for initial and induced price increases. For instance, if $t_m = 0.3$, $t_a = 0.2$ and k = 0.5 the wage multiplier becomes about 2.7.

workers. This control of timing was mainly justified as a method of ironing out seasonal fluctuations in building activity.

Another development in the liberalization of economic policy was that price control was gradually abolished in the middle of the Fifties. It was replaced by a very positive attitude towards price competition, which was supported by a new anti–monopoly legislation. The new policy, hinted at earlier by the Myrdal Commission, was adopted by Parliament in 1955 on the proposal of a government committee headed by Richard Sterner [190]. The policy included continuous public studies and reports on the development of prices and profit margins in the private sector—in practice mainly in the retail sector.

General monetary and fiscal policy began to play an increasingly important role in the Fifties. Thus, the low interest rate policy of the forties—heavily criticized by economists such as Bertil Ohlin, Arthur Montgomery, Erik Lindahl, and Erik Lundberg, as well as by bankers such as Jacob Wallenberg, Ernfrid Browaldh and Lars-Erik Thunholm —was gradually abandoned after the mid–Fifties, though to begin with rather reluctantly. The shift in monetary policy started with, and has all the time been accompanied by, numerous experiments with direct control of the portfolio policy of the banks and other credit institutions—cash and liquidity ratios, loan ceilings etc. (See section VII.) Thus, the excess demand in the markets for commodities, which had characterized the policy in the Forties, was replaced by excess demand in the credit market, whereas the government in the Forties had supplied practically all credit demanded.

Tax policy also came to play a more important role than earlier. Some attempts made in the forties to "sterilize" unusually high business profits were repeated during the Korean boom. Profit tax rates, and to some extent depreciation rules, were changed (in 1955) for the purpose of economic stabilization. Income taxation of households increased "automatically" as inflation, as well as the expansion of real income, moved more and more tax–payers to higher income brackets in the progressive income tax structure. From about 1960 indirect taxation came to play an ever more important role, by social security fees and by the introduction and gradual increase of a sales tax, at present 11 per cent. Another important event in economic policy was the introduction in 1960 of a compulsory pension system (the AP–system), designed to guarantee most income earners a total pension amounting to 60 per cent of their previous peak incomes (average of fifteen best years). Since the pension plan was expected to result in a fall in private saving, a pension fund was created on the basis of pension contributions paid by firms in proportion to labor costs, a kind of labor tax.

The pension contributions will in 1969 reach a level of 9.5 per cent of wages and salaries. As the contributions have not been used for short–run stabilization policy, the growth of the fund is mainly of interest from the point of view of long–run policy. Indirectly the creation of the fund has, however, some importance also for short-run stabilization policy. If profits are squeezed by the rising pension contributions, firms become more sensitive to monetary policy. However, to the extent that contributions are instead shifted to the real incomes of wage–earners, pension contributions act as a general contractive force on consumer demand. (See section IX.)

Due to these developments, the total marginal tax rate in Sweden (including social insurance), with respect to GNP, has risen from less than 40 per cent in the mid–Fifties to slightly more than 50 per cent in the mid-Sixties. Thus, compared to most other highly developed countries, Sweden must be characterized as a "high-tax economy." Another characteristic feature of the Swedish tax system is that income taxes play a relatively large role. At the present time, a rather "typical," married tax payer, with a family income of 20–24,000 kronor per year (3,900–4,600 dollars), has a *marginal* income tax rate of about 40 per cent.

Some new tools of fiscal policy have also been tried, mainly to influence private investment. Two methods deserve particular attention: a tax on investment expenditure ("investment taxation") and investment reserve funds for private firms. (See section VI.)

As in the Forties, government spending has been varied for stabilization purposes. Since the policy has been characterized by strong expansion in recessions, rather than by reductions in booms, the public sector has expanded much more rapidly than GNP over the whole period. (See section VIII.) The counter–cyclical variations in public spending have been integrated with a more and more ambitious labor market (mobility) policy. This policy has been rather selective, since the actions have been undertaken in sectors and geographical regions where demand has been particularly weak. The policy has included public works and orders and subsidies to private firms as well as retraining and grants to induce the labor force to move. At the present time, almost one per cent of the labor force is more or less continuously engaged in public works or retraining in connection with the activities of the Labor Market Board (Chart 3). From 1956 to 1966 the budget of the Labor Market Board rose from 140 to about 1,000 million kronor. However, in spite of the expansion of labor mobility policy, traditional public relief works still amount to about two–thirds of total expenditures by the Labor Market Board (location policy and investment funds policy not included). The "new" methods, retraining programs

and labor mobility policy, amount to no more than 10–15 per cent of total expenditures by the Labor Market Board. It should be noticed, however, that public works nowadays employ a larger number of old and handicapped people than earlier.

Thus, the policy in the late fifties and early sixties realized to some extent Rehn's ideas, except for the fact that the general excess demand for labor was never reduced significantly by general contractive policy, in spite of the pension contributions and the general sales tax.[22] Nevertheless profits were, in accordance with Rehn's ideas, squeezed in the mid–sixties, partly due to indirect taxes and social security fees, but partly also due to a rather rapid rate of domestic inflation compared to the increase of world market prices.

The outflow of labor from certain less industrialized parts of the country, mainly in the north—to some extent the result of the active labor market (mobility) policy—created a rising political resistance among the politicians in the northern part of the country in the beginning of the sixties—a "northern backlash." As a result, government policy started to put more emphasis than earlier on regional development policy. This policy was reinforced in 1963–64 by a program of subsidies and loans to private industries willing to invest in the northern parts of the country. The implementation of the investment funds policy has in recent years been used for the same purpose. (See sections VIII and IX.)

Generally, stabilization policy in Sweden in the post–war period has been more successful in preventing recession than in checking inflationary tendencies. Partly, this reflects the high preference of the government for full employment as contrasted with price stability. Another explanation is presumably that an expansive fiscal policy is politically much simpler than a contractive policy. The most successful time thus far for stabilization policy seems to be the period 1955–63, particularly 1960–63. A main policy achievement was to move the expansion of private investment from the boom in 1955–57 to the 1958 recession, though this was not enough to prevent a rise in unemployment in 1958 (Chart 3B). This was brought about by a battery of actions: investment taxes, loan ceiling for banks, interest rate increases and to some extent investment funds policy. (See Chart 4.) In the 1960–61 boom, the restrictive actions were instead taken mainly against public investment and private consumption, via the introduction of a sales tax

[22] The labor market seems to have been more in balance—with less excess demand—in the mid-Fifties than in both the late Forties and early Sixties; (See Chart 3A). Comparing the Sixties with the late Forties, it would seem that the balance in the labor market has improved somewhat, at the same time as the level of unemployment has become somewhat lower. (Chart 3B.) Taken by themselves, these changes would tend to push the Phillips curve down.

and pension contributions. (To some extent the sales tax applies also to capital goods and intermediary products.) The tendencies to recession in 1962 were fought mainly by an expansion of public investment and housebuilding.

A weak point in the policy has been that the expansionary actions in recessions usually have been cut off too late in the next upswing, such as in 1959 and in 1963/64. In the expansionary phase 1963/65 the policy must be regarded as a serious failure, since it was expansionary rather than contractive. Rather late in the boom, at the end of 1965, building control was reintroduced, mainly for the purpose of reducing building activity of local governments and the service sector—and hence to make possible an expansion of investment in industry and (later on) housebuilding. The measures against the service sector were accentuated by a temporary 25 per cent investment tax (March 1967) against investment in the service sector. One explanation for the partial reintroduction of direct building control is presumably that general fiscal policy failed, another that the government wanted to concentrate investment to industry, for the purpose of avoiding a threatening balance of payments crisis. Just at the end of the inflated boom, the beginning of 1966, a 3–year wage negotiation was settled, which "guarantees" that the effects of the demand inflation in 1964–65 will be followed by a three–year period of cost inflation. The extensive use of higher indirect taxes and social security fees have also helped to push up prices via cost–inflation. (For a further discussion of this problem, see section XI.)

It is also of interest to note that practically no attempts have been made to pursue an incomes policy after the negative experiences of the late Forties. Instead, incomes policy has, so to speak, been delegated to the labor market organizations, which particularly since the middle of the Fifties have been engaged in highly centralized bargaining on a country–wide basis.[23]

The "liberalization" of economic policy in the fifties met with very little opposition—except for the abolition of the low interest rate doctrine. Thus, hardly anybody was arguing for more direct controls rather than less. However, in step with the removement of many direct controls new methods of economic policy, using incentives and control of credit, have been developed. Thus, even if the detailed control of the economy has diminished, other types of interventions have been introduced instead.

[23] On the labor side there are four main organizations—two large and two rather small. The large ones are the Confederation of Trade Unions (LO) and the Central Organization for Salaried Employees (TCO). The small ones are an organization for professional salary-earners with an academic education (SACO) and an organization for certain higher officers in the government sector (SR). The employer side is completely dominated by the Employer's Confederation (SAF) and the government. See Holmberg [52].

## V. *The Theory of General Fiscal Policy: the Budget Balance Discussion*

A deliberate counter–cyclical fiscal policy was introduced in Sweden as early as 1933, in the first budget presented by the Social Democratic Minister of Finance, Ernst Wigforss. It appears that Wigforss was inspired mainly by the British discussion in the late twenties, in which Keynes and Henderson were most active, concerning the possibility of fighting unemployment by expansionary fiscal policy.[24] In an appendix to the budget, Gunnar Myrdal defended the policy on theoretical grounds [115]. Myrdal's analysis was further developed in his pioneering book on *The Economic Effects of Fiscal Policy* [116] (in Swedish) published in 1934. Another pioneering work in the field of fiscal policy was Bertil Ohlin's *Monetary Policy, Tariffs, Subsidies and Public Works* [124] (in Swedish).

The objective in the thirties was mainly to *even out* cyclical fluctuations, though at the highest possible employment level. It was believed that this could be achieved by underbalancing the budget in recessions and overbalancing it in boom periods. It was argued by Myrdal and others that a policy of this type was quite consistent with a balancing of the budget over the cycle—a principle which was suggested as a replacement for balancing the budget each year.

This type of counter–cyclical policy was officially recognized in the 1937 budget reform, designed largely by Dag Hammarskjöld. In this reform, a sharp distinction was made between the budget on current account and the budget on capital account. This division was chiefly designed to highlight the development of the wealth position of the public sector, and the contribution by the government sector to capital formation and hence to the productivity of the economy. It was also assumed that the financing principles should be different for the two parts of the budget. In normal times, the capital budget should be financed by loans whereas the current budget should be financed by taxes. In boom periods the current budget should, however, be overbalanced, hence part of the capital budget would be financed by taxes; in recessions the current budget should be underbalanced, hence partly financed by loans. However, the war soon made it impossible to follow these budget balance principles.

Immediately after the war there was a discussion whether these rather rigid financing rules were an impediment to a rational fiscal policy. Hammarskjöld, in a document in 1946 [34], argued that the rules were somewhat too rigid. He believed that it was not necessary to balance the current account over the cycle, though he wanted to be cautious about underbalancing because of possible effects on the future

[24] See Landgren [69].

wealth position of the government sector and on the future tax burden. Welinder [168] agreed that the rigid budget rules of 1937 were an obstacle to an efficient policy. But he believed, in opposition to Hammarskjöld, that the issue about the wealth position of the government sector was not very important, compared to the goal of full employment, and that therefore deficits in recessions were not much to worry about even if corresponding surpluses would not arise during booms. His main point was that the problem of the size of the public debt is a purely technical tax issue. (Thus Welinder neglected the aspect that the choice between tax finance and loan finance influences the investment ratio, and hence "the tax burden" between generations.)

The principles of budget balancing played a great role in the economic policy debate during the Fifties. The debate was permanently confused, however, since the politicians geared their policy sometimes to general economic effects on the economy, and sometimes to the effects on the financial position of the government (a balanced budget being regarded as a goal). In general, the government was inclined to refer to macro–economic arguments when it wanted a surplus on the current budget in boom periods, and to budget balancing principles if a deficit tended to occur during a boom. The opposition, at that time anxious to cut taxes, referred to the existence of a surplus on the current budget when they wanted to give the impression that there was "room" for tax reductions—hence arguing as if a balanced budget was a fundamental goal. Both the government and the opposition manipulated the division of the budget between current and capital account to support their respective economic policy positions. Thus, when the government wanted to motivate a more restrictive fiscal policy, it moved expenditure items from the capital budget to the current account to increase the deficit on the latter. The opposition, on the other hand, moved items from the current account to the capital account, thereby "creating" a surplus on the current account, which was said to indicate space for tax reductions. Thus the division of the budget into capital and current accounts facilitated tactical political maneuvers and hampered the fiscal policy debate for many years by focusing it on complicated bookkeeping issues understood by very few and of very little economic relevance.

In the latter part of the Fifties, the government talked more about the total budget, current plus capital, which usually showed a deficit, than about the current budget, which often was in surplus. The tactical plan was, of course, to make it impossible to argue for tax reductions or expenditure increases by referring to a "budget surplus." The conventional character of this budget balance concept too should be stressed, however, since on the expenditure side credit to housing is included, whereas pension contributions (in the AP–system) are not included

on the revenue side. If the credit supplied to housing was replaced by government guaranteed loans in the credit market, and if pension contributions were included in the budget, the "total budget" would be considerably overbalanced permanently.

The most penetrating theoretical analysis of the problem of the budget balance by a Swedish author is found in Bent Hansen's book *The Economic Theory of Fiscal Policy*. Hansen's analysis is an application to fiscal policy of a general theory of goals and means in economic models. The substance of his general theory is rather similar to Tinbergen's well-known analysis, developed immediately before Hansen's analysis. The difference between the two expositions is mainly that Hansen's analysis was developed along more general lines, with reference to an unspecified system of equations à la Samuelson's *Foundations*, whereas Tinbergen used more specified and concrete models along the lines of the Central Plan Bureau in the Netherlands.

Hansen showed that in models where tax revenues were endogenous variables, the budget balance is neither an instrument of policy nor a comprehensive (unique) indicator of the economic effects of fiscal policy. For instance, a given change in the budget balance can be achieved by a great number of different parameter changes, all of which have different effects on basic economic variables, such as employment, output and prices, and is itself affected by those basic variables. This limitation of the budget balance as an indicator of the economic effects of fiscal policy had been touched upon already by Myrdal, Hammarskjöld and, above all Welinder, though without drawing the full consequences of their observation. The point had been brought up also by Erik Lundberg [87, ch. IX], though without Hansen's more rigorous theoretical framework. As it is methodologically suspect to analyze the *effects* of changes in endogenous variables, Hansen's conclusion was that an analysis of the budget has to be based on changes in the "true" parameters of action of the government, rather than on changes in the budget balance.

Hansen's theoretical work inspired an empirical study by Assar Lindbeck [75] of the economic effects of fiscal policy in Sweden in the period 1953–56. The approach in this study was to analyze separately all parameter changes in the government budget on the revenue and expenditure sides and to specify the *direct effects* of each parameter change on the demand for consumer goods and capital goods. The "direct effects" were defined as the *ceteris paribus* effects, i.e. the shifts in the demand curves in the markets for consumer goods and capital goods. After that, these *ceteris paribus* effects of all separate parameter changes were added for each market. In the context of a simple Keynesian multiplier model, it may be said that the study specified the multi-

plicand of the effects of changes in the government budget. A conclusion of the study was that the effects of discretionary fiscal policy actions on the economy in the boom period 1954–56 were expansionary. However, the "fiscal drag" of the automatic stabilizers in the budget was so strong that the "net effects" of discretionary actions *and* automatic stabilizers on aggregate demand were contractionary. Lindbeck's study was followed up for later years by the National Institute of Economic Research, then under the directorship of Bent Hansen [42] [181, for the years 1957–60], and the methods of analysis were further developed; for instance the analysis was not confined to a study of direct effects, i.e. the multiplicand, but instead the direct effects were multiplied by a "keynesian" multiplier to obtain total effects.[25]

Bent Hansen in his *Economic Theory of Fiscal Policy* also tried to show that the adoption of a goal concerning the budget balance, for instance the goal of a balanced budget, was not a restriction on fiscal policy. His argument was that the introduction of an additional goal only meant that an additional instrument has to be introduced, which naturally follows from Hansen's theoretical analysis of the relations between goals and means in a general equilibrium model, according to which it is necessary to use the same number of means as the number of goals.[26] However, against Hansen's line of reasoning it can be argued that there is always a restriction on the number of parameters available to the government, and on the ways in which these parameters can be changed. Therefore, there is in reality only a limited number of policy mixes that are politically feasible in a given political situation. If an additional goal is established, such as a given state of the budget balance, the number of politically feasible policy mixes is still further reduced, and might even become zero. Thus, the introduction of a goal concerning the state of the budget balance will in practice reduce the freedom of action for fiscal policy, and consequently be a restraint for fiscal policy.

[25] Rather similar analyses have later been presented for the U.S. by E. Cary Brown [16] and Richard Musgrave [112]. Whereas Brown's analysis was confined to the effects of discretionary actions, i.e. parameter changes, Lindbeck's study also included the effects of the budget as a built-in stabilizer, i.e., the effects of automatic changes in endogenous variables in the budget. The latter effects were defined as the difference between the actual development of the economy in a period and the hypothetical development in the case where no budget items were endogenous variables in the economic system, i.e. where the marginal tax rates were zero. Musgrave, like Hansen, used a multiplier to get the total effects on gross national product.

[26] Hansen admitted that there may be *specific* models where a smaller (larger) number of means than goals were sufficient (necessary) [41, pp. 9–22]. As illustrated by analyses by Lindbeck [77, pp. 151–73] [81, pp. 67–72] and Puu [134, pp. 56–68] such models may be quite common in economic theory.

Another application of Hansen's goals–means analysis was to demonstrate that various economic policy actions must be coordinated if the policy is to be successful. In particular Hansen argued that monetary and fiscal policy had to be coordinated in order to reach the double goal of full employment and price stability. Hansen's analysis was partly a polemic against Erik Lindahl, who wanted the central bank to be responsible for the price level, while the government should take the responsibility for the employment level [72] [192, a public report with Lindahl as co-author]. The basic reason for Lindahl's position seemed to be that he did not believe that the political leaders had the courage to take effective anti–inflationary action. For this reason he wanted an "independent" central bank with responsibility for the price level only. Hansen showed how an explosive cobweb cycle for prices and employment may arise if the central bank acted to reach one goal, for instance price stability, whereas the Treasury tried to achieve another goal such as full employment.[27]

## VI. *Innovations in Fiscal Policy: Methods of Influencing Private Investment*

### A. *Theoretical Developments*

An important objective in Swedish economic policy in the post-war period has been to control the level of aggregate investment. These attempts have also met with some success (Charts 1C and 2A). We can hardly say that any explicit and uniform theory of investment lies behind these policies. In official business cycle forecasts (by the National Institute of Economic Research and the National Budgets), private investment has usually been treated as an autonomous variable, the projection of which has been based mainly on survey data of investment plans. However, the figures from the surveys have usually been adjusted somewhat in the forecasts by ad hoc considerations, whereby a number of factors, such as profits and the availability of liquid assets, internal funds and credit have been regarded as important for the realization of the plans expressed in the surveys. In recent years, some experiments have also been made with econometric investment functions, as complements to other types of information. However, in general there has been much skepticism among Swedish forecasters about econometric investment functions.

In economic policy directed towards investment, public investment has been controlled by direct administrative means and housebuilding

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[27] Compare Mundell's demonstration (in 1962) of how poorly co-ordinated monetary and fiscal policy may create unstability, the targets being internal and external balance [111].

mainly through the supply of government credit via the state budget. Private investment, on the other hand, has been influenced mainly by incentives, particularly after the liberalization of building control in the end of the Fifties.

In the Thirties, the single most important policy action to influence private investment was presumably the introduction of free depreciation rules in 1938. The main arguments for this change were based on long–run structural efficiency aspects rather than short-run stabilization aspects. (Swedish short–run fiscal policy in the Thirties was concerned mainly with public works and private consumption.)

In the post–war period, by contrast, policies directed towards private investment have been geared more to short–run stabilization aspects, i.e. to influencing the *timing* of private investment. This is the case for short–run monetary and fiscal policy actions as well as for the stiffening of the depreciation rules in 1955; the latter reform was largely justified as a way of making private investment more sensitive to stabilization policy—monetary as well as fiscal.

The simple basic idea behind all these reforms has obviously been that the *timing* of private investment can be modified by changes in investment costs, and hence profitability, as well as by changes in "liquidity," the latter concept referring to the availability of both internal funds and credit. It is difficult to say to what extent the reforms have been influenced, directly or indirectly, by developments in economic theory. The economists of "the Stockholm School" in the Thirties certainly developed sophisticated, though rather esoteric, theories about factors influencing private investment. For instance, Myrdal [113] and Svennilson [145] constructed a theoretical framework for investment analysis in which expectations and uncertainty about future prices and demand conditions played a central role, and where Myrdal's new concepts "ex ante" and "ex post" were strategic. Svennilson's analysis may, in fact, be regarded as a forerunner of what is nowadays called "dynamic programming," as formulated by for instance R. Bellman [12]. However, of more immediate relevance to problems of stabilization policy is the point made by Tord Palander in the beginning of the Forties, in a critical examination of Myrdal's investment theory: "What is neglected in Myrdal's analysis is that, for an investment to be made at a particular time, it is not only necessary that it is regarded by the entrepreneur as profitable at the time (i.e. in Myrdal's terminology, as giving a gain from investment), but also that that time is regarded by the entrepreneur as the *best possible* for carrying out this investment. In this respect Myrdal is in numerous and famous company, which includes Keynes, amongst others" [131, p. 33]. Ob-

viously Palander's line of thought has immediate relevance for the objective of Swedish stabilization policy in the post–war period to create incentives for firms to change the *timing* of their investment expenditure.

Whereas the stress on the profitability aspect of investment decisions is in line with the main stream of economic theory, the source of the emphasis on the importance of internal funds is more uncertain. However, Svennilson stressed the liquidity aspects of investment planning in his study of 1938 [145], and in the middle Fifties the importance of internal funds was emphasized by Lars Lindberger [83]. Lindberger's basic ideas, in fact, were rather similar to what has later been called "the residual funds theory" of investment behavior, as formulated for instance by Meyer and Kuh [106]. However, though Lindberger developed his approach against the background of empirical macro–relations for Sweden, there was hardly any rigorous statistical testing of the hypothesis in Lindberger's study.

The concept of the importance of internal funds for investment behavior was stressed also by Erik Lundberg in the early sixties [88, ch. 10]. In his work the notion that firms prefer internal funds was expressed mainly by the assumption that the required rate of return is higher for borrowed funds than for internal funds, the reason being that the risk of a project rises with the ratio of borrowed to internal capital.[28] Assar Lindbeck has tried to integrate the notion of a preference for internal funds with a general theory of the firm, by assuming that the firm does not maximize profits but instead a preference function in which beside profit, various types of assets and debt enter as arguments, debt being regarded as a "disutility" (debt aversion) [77, ch. 3] [81, sect. II].[29] On the basis of this approach, the availability of internal funds will have importance for investment behavior even if there are no imperfections in the credit market, in the sense that every firm can obtain whatever funds of credit it desires at a given interest rate.

Other contributions to investment theory have been made by Guy Arvidsson [8] [9] and Bjørn Thalberg [156–158]. Arvidsson has tied together short–run production theory with traditional investment theory and Thalberg has developed the theory of the market for capital goods, along lines suggested by Haavelmo, where delivery–time is de-

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[28] Lundberg's approach is somewhat similar to that one earlier followed by for instance E. Hoover [53] and J. Duesenberry [24, chapt. 5]. Lundberg also incorporated an idea from Modigliani and Miller [108] that the financial policy of the firm depends on how different alternatives influence the capital value of the firm in the hands of shareholders.

[29] This approach was inspired mainly by J. Marschak [101] and L. Klein [60, pp. 27–32].

termined endogenously together with capital goods prices and investment volume. Thalberg has also integrated his model of the capital goods market into Keynes's and Goodwin's macro models.[30]

## B. *Investment Taxes and Investment Funds*

In the Swedish attempt to stabilize private investment, two fiscal policy "innovations" are of particular interest—taxes on investment expenditure, and investment funds policy. As both methods seem to be quite promising ways of influencing private investment, a detailed comment on their principles as well as on their actual use in Swedish economic policy is appropriate.

General investment taxes have been used during two boom periods in Sweden, 1952–53 and 1955–57; in the first period they amounted to 10 per cent of investment costs, in the second to 12 per cent. The tax rate was applied to gross investment in building and machinery, excluding housing and most public investment. Investment taxes are deductible for income taxation purposes. As the income tax rate for corporations is about 50 per cent in Sweden, the *net* (after tax) investment tax rate was about 5 and 6 per cent respectively in the two periods. Two empirical studies have been made in Sweden, using the questionnaire technique, of the effects on investment in industry of the 1955–56 investment tax—one study by Guy Arvidsson [2], the other by Krister Wickman [170]. Firms were asked how much they had in fact revised their investment plans *firstly* because of the investment tax, introduced in the beginning of 1955, and *secondly* because of the tighter credit market situation which was created a few months later. The firms were also asked to try to distinguish between the effects of the higher interest rates on the one hand, and the more stringent credit rationing on the other. (The interest rate on "typical" industrial bonds increased by slightly more than one percentage point at that time.) (Chart 5.)

According to these studies, (planned) investment by industry was reduced by about 15 per cent due to these policy actions. The effect of the investment tax, which was declared to be temporary, was several times stronger than the effect of the interest rate increase; the studies indicate a short–run *price* elasticity of investment expenditure of about one half (in the case of the temporary investment tax). According to the studies, the credit rationing was of about the same importance as the investment tax—according to the 1956 study even more im-

[30] Arvidsson [3] and Thalberg [155] have also shown that the traditional view that long-term investment is more sensitive than short-term investment to interest rate changes is not generally true; the opposite may be the case if the marginal efficiency of investment schedule happens to be steeper for short-term investment. The effects on the factual investment volume depends also on the supply elasticity of capital goods with different durability.

Chart 5

A = Actual yield of typical bonds of manufacturing companies (monthly figures)

B = Official discount rate

C = Actual yield of Swedish Government securities without fixed maturity (monthly figures)
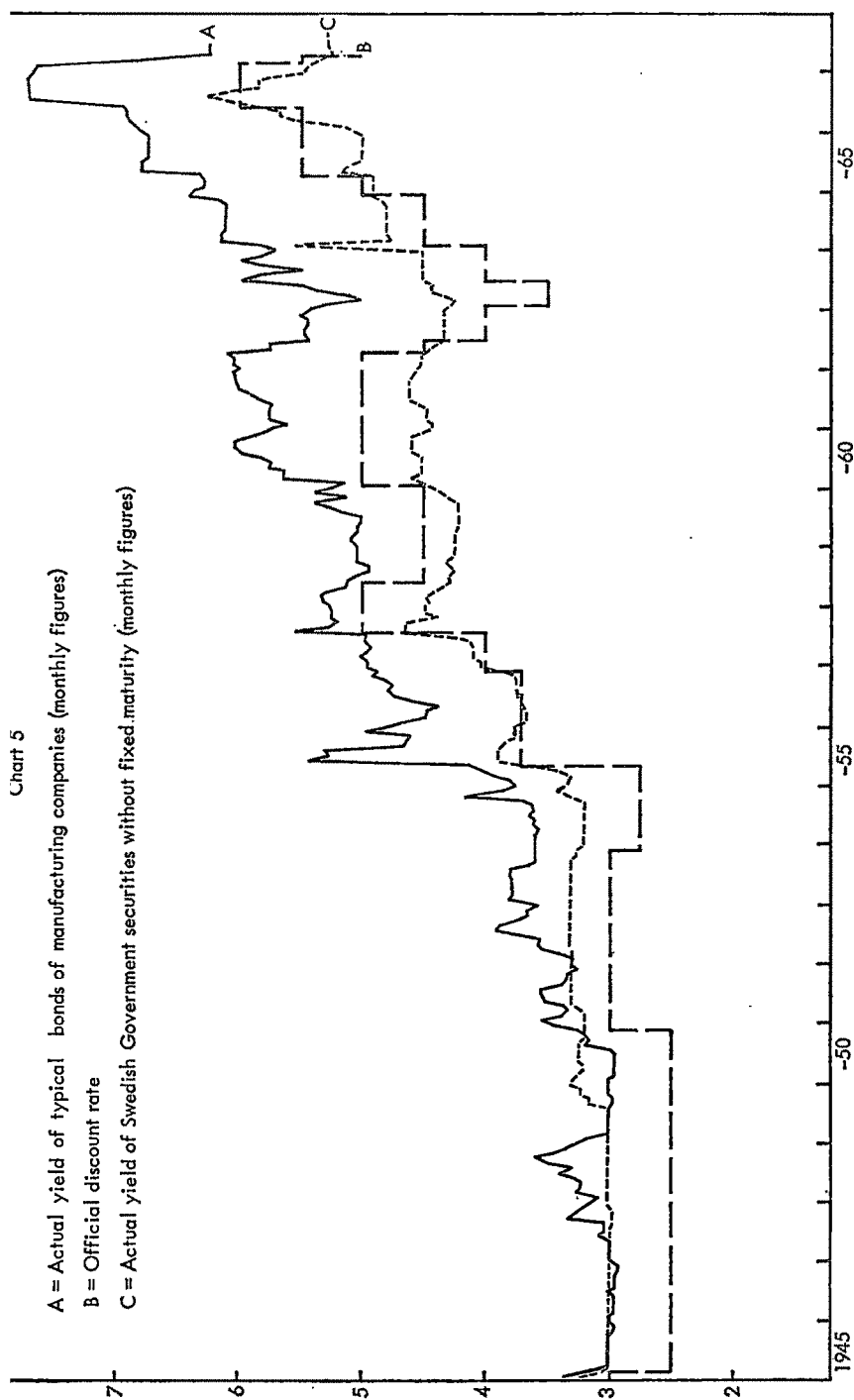


*Sources to Chart 5:* Discount rates and interest rates on government securities: Riksbankens Årsbok. Interest rates on industrial loans: Skandinaviska Banken (figures published in Allmän Månadsstatistik).

portant.[31] Another interesting feature of the studies is that about one third of the firms reacted rather quickly with cuts in their investment—within a year.

In the recession, when the investment tax was removed, private investment expanded considerably (see Chart 2A). However, there are no studies of the extent to which this was the effect of the removal of the investment tax.

Since 1958, the authorities have mainly relied on investment funds policy rather than on investment taxes to influence private investment. The investment funds system had been introduced in 1938, but did not play any role of importance until after 1956 when the system was reformed. With this system corporations, and certain other types of firms, are allowed to set aside as an investment–reserve fund a certain fraction, 40 per cent, of profits before tax. This investment reserve is exempt from taxation, but 46 per cent of the sum has to be deposited in a blocked account with the central bank (with no interest rate); the rest is available to the firm. By certain tax–advantages, firms are stimulated to make appropriations to investment funds in boom periods and to utilize them for investment in recession periods. The idea is, consequently, as in the use of temporary investment taxes, to induce

[31] The results of the studies are summarized in the following table [181, autumn 1957]:

|  | Per cent reduction in investment in 1955: | | ·Per cent reduction in investment in 1955/56: |
|---|---|---|---|
|  | According to 1955 study | According to 1956 study | According to 1956 study |
| Due to |  |  |  |
| Investment tax | 5.8 | 5.0 | 3.2 |
| Interest rate increase | 0.8 | 0.7 | 0.7 |
| Stiffer credit rationing | 3.9 | 6.9 | 9.1 |
| Undistributed effect | 3.5 | 1.7 | 1.0 |
| Total effect | 14.0 | 14.3 | 14.0 |

As seen from the table, the 1956 study gives stronger effects for credit rationing (in 1955) than the 1955 study. A possible explanation is that the tighter credit policy had been in force only during two months when the 1955 study was made, whereas the investment tax had been in force for about half a year.

The total effects reported by the studies might be rather realistic, as the results are quite consistent with other types of information. More specifically, we know that actual investment by industry (ex post) was about 15 per cent lower than according to investment plans (ex ante), reported regularly in the survey undertaken by the National Institute of Economic Research before the policy measures. These results have been challenged by Eliasson in an econometric study [26]. The result of his study is that the effects were both delayed (by about one year) and of much smaller magnitude than according to the studies by Arvidsson and Wickman.

firms to change the timing of their investment expenditure from booms to recessions.[32]

The basic incentive in the investment fund system is that firms are allowed to deduct new additions to the fund from their current profit for purpose of profit taxation. Thus, the investment fund may be characterized as an appropriation, free of tax, for investment in the future. The immediate advantage to the firm is a minor gain of liquidity; the alternative to depositions of 46 per cent of the appropriations to blocked accounts in the central bank is to pay profit taxes, presently amounting to 51 per cent. The main incentive, however, is that the investment funds, still free from taxes, later on may be used for investment expenditures. Moreover, if the funds are used at a time when the government finds this appropriate from the point of view of economic stability, the firm is allowed to make an additional deduction from profits of 10 per cent of the amount taken from the investment funds. Thus, the system implies tax deductions by immediate depreciation charges in excess of 100 per cent (110 per cent) of the investment cost —in addition to the previously mentioned immediate liquidity gain. Hence, the idea of investment funds is similar to that of accelerated depreciation. We may say that the system is approximately equivalent to free depreciation confined to recession periods. The firm obtains a "tax-subsidy" which amounts to the value of the tax reduction (due to the deposition and the ten per cent investment deduction) *minus* the capital value of future tax increases due to lost opportunities of "normal" depreciation deductions.

If a firm chooses to use its investment funds without permission of the authorities, which it can, the fund is subject to the usual profit taxation, and there is also a special penalty-tax imposed by the addition to taxable income of 10 per cent of the amount taken from the investment fund.[33] As an indicator of the potential importance of investment funds policy, it may be mentioned that in 1965 they amounted to 3.3 billion kronor (about 0.64 billion dollars), compared to a total of gross investment (excluding repair and maintenance) by private manufacturing industry of about 5 billion kronor per year.

The government has permitted firms to use their investment funds under favorable conditions during three main periods—1958–59, 1962–63 and 1967. In 1958 and 1959, private investment increased by 7 per cent each year, in spite of obvious tendencies to a recession. However, no empirical study is available of the extent to which this devel-

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[32] For a presentation and analysis of investment funds policy, see Eliasson [25], Edenhammar and Johansson [23] [56].

[33] The firm can use 30 per cent of the deposition freely after 5 years, however (the so called "free sector").

opment was the result of the investment funds policy rather than of other measures, such as the abolition of the investment tax and a shift to an easier monetary policy. There seems to be general agreement, however, that the release of funds lasted for so long that a substantial part of the investment expenditure generated by the action came in the beginning of the next boom (end of 1959).

The effects of the release of investment funds in 1962–63 have been studied empirically by the use of a questionnaire technique [25]. According to this study, there was a well–timed *net* effect (compared to the hypothetical case without a funds release) on private gross industrial construction during the ten–month period July 1962–April 1963, amounting to about 15 per cent of total annual industrial construction. There was also, during a five–month period, a net increase in orders placed for machinery and equipment of about 5 per cent of total annual industrial machinery investment. That the timing of the policy was good is indicated by a finding of the study, that the net effect reached its maximum in the middle of the recession in the beginning of 1963, nine to ten months after the announcement of the release of the funds. The effects had disappeared by the middle of 1963, well in time before the next boom.

## C. *Comparison with Interest Rate Policy*

Both investment taxes and investment funds policy work somewhat similarly to monetary policy—via profitability as well as via liquidity. There are, however, some differences between the techniques worth noticing. It is convenient to compare the two fiscal methods by contrasting each one with interest rate policy. However, it is rather difficult to translate the profitability effects of investment taxation and investment funds policy in a general way; the outcome of a translation of that kind depends *inter alia* on the durability of the investment project and the timing of the income generated. But it is obvious that investment taxes and investment funds policy, such as have been implemented in Sweden, have profitability effects which are considerable compared to the effects of interest rate variations of the magnitude usually practiced. This is so in particular for short– and medium–term investment.[34] We would expect that the effects of investment taxes will

[34] Suppose that the interest rate for an investment project, financed by credit, is reduced during one year and then returns to the initial level. To influence the profitability of the project as much as it would be reduced by a one-year (removal of an) investment tax by 12 per cent, the interest rate reduction obviously has to be 12 percentage points. To get the same profitability effect by interest rate policy as by the utilization of investment funds, an interest rate reduction by 60–80 percentage points would be required in the case of a building investment (with a service life and depreciation time of 50 years). If the investor pays the lower interest rate for a longer period, the profitability effect of the interest rate

be greater if the tax is expected to be temporary, when substitution effects between periods are created, than if it is expected to be permanent. When comparing with interest rate policy it may also be of importance that the cost effects of investment taxes are obvious to firms whether they invest with internal or with borrowed funds. By contrast, it is often asserted in monetary policy discussions that interest rate increases mainly influence investment with borrowed funds.

It has often been argued in Sweden that the effects of investment funds policy are mainly confined to the recession periods, whereas the contractive effects in the boom, according to this view, are small. It is true, of course, that it may be difficult to induce firms to reduce their investment expenditures in booms via appropriations to investment funds. However, some effects may be achieved by giving special favors to firms depositing 100 per cent of their appropriations to investment funds on blocked account in the central bank—a policy pursued in the 1960–61 boom. Moreover, by inducing firms to release funds and invest them in recessions, there will be a change in the timing of investment, which will more or less automatically reduce it in the booms. Such effects may occur either because firms speed up investment expenditures in a recession because of an investment funds release, or because firms postpone projects in a boom to take advantage of an expected release in the next recession.[35] An investment in a boom, rather than in a recession, will have an opportunity cost, due to the accelerated depreciation achieved by making appropriations to the investment funds in a boom and postponing the project to the next recession.

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reduction will be larger, of course, compared to the investment tax and investment funds-effects. Assume an investment project with constant cash flow over time. Suppose further that the internal rate of return is 8 per cent (before tax). In this case a removal of a 12 per cent investment tax, and an investment funds policy such as practiced in 1962–63, would be approximately equivalent in terms of profitability effects to the following permanent interest rate reduction (percentage points):

| Service-life (and depreciation time) of capital good | Investment tax | Investment funds |
|---|---|---|
| 5 years | 5 | 8 |
| 10 years | 4 | 7.5 |
| 50 years | 1 | 7 |

(Machines are usually written off in 5 years and buildings in 25–50 years in Sweden.) The figures for investment funds policy refer to the case when investment funds deduction results in a loss of normal tax depreciations. The comparison does not include the immediate liquidity (and attached profitability) gain when 46 per cent of the appropriation is deposited in the central bank rather than 51 per cent of profits being paid as taxes. And the figures do not include the special tax advantages in the 1960–61 boom for firms depositing 100 per cent of their appropriation to investment funds in the blocked accounts in the central bank.

[35] The existence of a "speeding-up" effect is empirically fairly well established [23].

Like interest rate policy, both investment taxation and investment funds policy may be classified as rather *general* types of economic policy. Private firms are allowed to decide for themselves what type of investment they want to make; the government mainly influences the cost of choosing one timing rather than another. However, both methods can, if desired, easily be used in a selective way, by gearing the actions to particular types of investment, sectors and geographical areas. In Sweden, this possibility has been used by exempting investment in housebuilding and public investment from investment taxes, the reason being that these sectors are regulated by other measures, mainly direct control and government credit. However, with regard to the private sector, the main releases of investment funds, in 1958–59, 1962–63 and 1967, were general, hence without any discrimination intended between firms and regions. On the other hand, there was a differentiation with respect to construction and machinery. Moreover, the 25 per cent investment tax on investment in the service sector in 1967 was designed to discriminate in favor of investment in the industrial sector—evidently to help restore balance in the current account.[36]

A difference between investment taxes and investment funds, on one hand, and interest rate policy, on the other, is that the former methods do not generate the same type of "undesirable" side effects as interest rate policy. For instance, the market value of the outstanding stock of bonds will not be disturbed in the same way as in the case of substantial interest rate changes. (In other connections this fall in market values of bonds has been regarded as "desirable" as it gives a negative "wealth effect" on demand for commodities and supply of private credit; an example is the American availability theory.) Moreover, no immediate problems will arise of changes in the cost of government debt, and of changes in the distribution of income and wealth between debtors and creditors. The fact that such side effects can largely be avoided is important, as these effects in many countries have constituted basic arguments against a powerful monetary policy.[37]

[36] In 1961 the policy was used in a more selective way by a specific release for the pulp industry, which had a recession in that period. There has also been some other minor selective releases of this type. During the period 1964–66, releases have been used to stimulate industrial activity in the northern parts of the country, as a contribution to regional development policy; see section VIII.

[37] Investment taxes and investment funds policy also have some credit market effects. A payment of investment taxes reduces deposits and liquid assets of the banking system, as in Sweden the Treasury keeps its balances in the central bank rather than in the commercial banks. Similarly there was a tightening of the credit market when industrial firms in 1960–61 were induced by certain types of incentives to make 100 per cent of their appropriations to investment funds as deposits on blocked accounts in the central bank. The reduction in deposits and liquid assets of the commercial banking system which then occurred was equivalent to the effects of considerable open market sales. However, such credit market effects are not an intrinsic part of investment taxes and investment funds policy; the effects on the commercial banking system may be removed, if desired, by open market operations.

One of the reasons for relying more on investment funds policy than on investment taxes in recent years seems to be that investment funds policy provides a closer control of the timing of investment. It is rather easy for the labor market authorities, which administer the releases, to make sure that investments are in fact made during the period of release; this is especially so for investment in buildings. The investment funds policy has also been closely synchronized with the Swedish system of building start permits, practiced for seasonal adjustment reasons. The timing of individual investment projects can in that way be easily adjusted according to local labor market conditions. In this connection a close cooperation between firms and local labor market authorities has been established. In the case of investment taxes, on the other hand, it is possible for firms in certain situations to adjust the timing of their payments and book-keeping so as to avoid investment taxes even if an investment has actually been made during a period of investment taxation. Moreover, as stressed by Wickman [171, pp. 8–13] and Eliasson [25, pp. 131–35], the easiness of administration of investment funds makes the system very flexible, so that the implementation can be changed rapidly, as new information about the economic situation is obtained. Time lags in the policy can for this reason be kept relatively short. Investment taxes, on the other hand, have to be decided in advance for a certain period, in practice for the whole country and for a whole calendar year. These administrative advantages of investment funds explain why it was possible in the 1962–63 recession to get a good timing of the effects.

An obvious problem with investment funds policy is that the system favors firms with high *past* profits. In comparison, variations in investment taxes, and general investment subsidies, have a more "neutral" effect on firms with different past profit records. In this sense, investments funds policy imparts a "conservative" bias to the allocation of resources among firms, compared to general investment taxes and interest rate policy. Clearly, this is an effect that has to be weighted against the advantages of the system from the point of view of pure stabilization policy. Moreover, it is presumably easier to achieve a reduction of private investment in booms by an investment tax than by investment funds policy. Thus, the two methods may be regarded as complements and not merely alternatives.

## VII. *Monetary Policy Experiences*

### A. *The Record*

Swedish monetary history after the Second World War might be divided schematically into three periods: 1945–50, with pegged interest rates and an easy ("passive") monetary policy; 1950–55, with at-

tempts to pursue a tight monetary policy at low interest rates and with direct controls in the credit market; 1955–66, with more and more reliance on "high" and flexible interest rates, still with a number of credit market regulations.[38]

Monetary policy in Sweden during the first years after the war followed the same general pattern as in most other countries. The stabilization of the interest rate at a low level, about 3 per cent for long–term government securities, was the main goal (Chart 5). The arguments for this policy were about the same as in most other highly developed countries. Thus, reference was made to various "undesirable" side effects of higher interest rates: effects on the distribution of income and on the interest cost of the government debt, "disturbances" on the credit market etc. However, particular importance was attached to the fact that, in a regulated economy, higher interest rates result in price increases via higher production costs. In particular, reference was made to the effects on rents, which have been controlled during the entire post war period.

It was also alleged that small and moderate interest rate increases are without much importance for aggregate demand, whereas large interest rate increases could not be accepted because of the above–mentioned "undesirable" side effects. Sometimes it was argued, rather inconsistently, that interest rate increases could result in unemployment. (It is not clear if the reason would be a sudden increase in the interest rate elasticity when rates reached a certain, rather high level, or if some collapse in "business confidence" was assumed to take place in the economy at high interest rates.) It was also said that monetary policy is too general ("blind") in its effects, as it hits sectors where no reduction of expenditure might be desired by the authorities, such as housebuilding. For these reasons direct controls of demand were regarded as a superior method.

On the basis of considerations of this kind, a very passive attitude towards monetary policy was taken by the authorities during the first years after World War II. To begin with, the central bank even argued that it could not influence interest rates effectively, not even those on government securities, but had to follow the market–determined development of the rates, in accordance with the prevailing interest rate expectations of the private sector. This argument was put forward mainly by Dag Hammarskjöld [35] [36], Under–Secretary of the Ministry of Finance and chairman of the board of the central bank, in defence of a reduction in interest rates early in 1945. Hammarskjöld's argument was strongly, and certainly correctly, criticized by Bent Han-

sen [37] [38] in a polemic between Hansen and Hammarskjöld in *Ekonomisk Tidskrift*.

When banks started to monetize their vast holdings of government securities in 1946, for the purpose of expanding private loans, the central bank abandoned its passive attitude to interest rates, in the sense that the bank now resisted the market forces tending to pull up interest rates. In fact, the central bank, by buying all securities supplied in the market, pegged the interest rate for government bonds at about 3 per cent. Thereby the central bank took a passive attitude towards the supply of private loans (rather than the interest rate) and consequently towards prevailing tendencies to excess demand for commodities and labor. The position of the bank was that these events were the result of too soft direct controls and too expansionary fiscal policy, whereas the policy of the central bank was regarded as having very little to do with these developments. In fact, the authorities regarded its policy as quite adequate in the existing situation: "The experiences of the past year indicate that the central bank has in the main been able to accomplish the stabilization of the long–term interest rate and has thereby preserved an important first condition for the government's general economic policy."[39]

The view of the bank continued to change, however, probably to some extent in response to heavy criticism from economists, politicians and bankers, who argued that the inflation and the associated deficit in the balance of trade were partly caused by the easy monetary policy. In particular, they pointed out that the abundant availability of credit was of crucial importance for the increase in spending even if small interest rate increases had no substantial effects. (The *theory* behind this point is developed below, section VII:C.)

However, already in 1948, the bank admitted in fact that a more restricted availability of credit could contribute to price stability. This meant, however, that the central bank faced a dilemma: how to restrict the volume of credit without raising the interest rate? This dilemma was clearly formulated in a report by the banking committee of Parliament, to which the central bank is responsible: "In the course of the past year the Riksbank has been faced with a difficult problem of simultaneously keeping the market easy enough to maintain the desired rate of interest but tight enough to reduce the volume of credit" [179, p. 12]. To solve this dilemma, the central bank tried on various occasions to limit the expansion of bank advances by "voluntary agreements" with commercial banks about cash reserves, liquid asset ratios

[39] Statement by banking committee of Parliament [179, p. 12]. For a lively discussion of the policy statements by the central bank during this period see Erik Lundberg [87, pp. 138–43].

and the volume of loans (such as in 1947, 1948, 1950 and 1952). How-
ever, the policy was difficult to implement in periods of heavy demand
for credit, as banks were very liquid and unwilling to abstain from pos-
sible profits. The central bank made some minor attempts to support its
policy by small increases in the discount rate (in 1950) and by accept-
ing a slight upward slide in other interest rates (Chart 5). However,
the bank retreated rather rapidly to purchases of government securities
to prevent a further upward drift of interest rates.

An attempt was made in 1951–52 to strengthen the power of the
central bank by a law according to which the government could give
the central bank the right to forbid interest rate increases and to fix
maximum interest rates on loans and minimum interest rates on bank
deposits. The law was never invoked, but with the law as a vague
threat in the background commercial banks became willing to follow
the "voluntary agreements" about cash reserve requirements and liquid
asset ratios more rigorously than earlier. At the same time the central
bank was given the power to control the amounts of and interest rates
on bond issues by municipalities and private firms, by a system of com-
pulsory applications for potential borrowers. This control of bond is-
sues has been one of the basic tools of monetary policy during the last
decade (the so called "bond queue").

By these new powers, the central bank finally succeeded in restrict-
ing lending by banks and a number of other credit institutions (credit
intermediaries). A restrictive monetary policy, with stiff credit ration-
ing at low interest rates, was thus applied in 1952–53 and, above all,
in 1955–56. In the latter period, a first break with the low interest
rate policy occurred, however, through an issue of a 4 per cent govern-
ment loan. At about the same time, direct control of the volume of
bank loans was introduced through a ceiling on the total of bank ad-
vances. The policy was implemented by a "voluntary agreement" be-
tween the central bank and commercial banks, implying a reduction of
the total of bank advances by 1 per cent within one month (compared
to the credit volume in the end of July the same year). In 1956 there
was a further agreement that the total of advances would be reduced by
5 per cent more within four months.

The reduction in credit supply, in combination with sticky interest
rates, resulted in a heavy excess demand for credit in the middle of the
Fifties, and hence in stringent credit rationing. In combination with
other measures, such as an investment tax and direct control of con-
struction, the boom in private investment was kept within a rather lim-
ited margin (Chart 2A). As pointed out earlier, the authorities suc-
ceeded in postponing, to some extent, the investment boom to the next

recession (1958), which must be regarded as a considerable achievement of economic policy at that time.

Since the middle of the Fifties, monetary policy has been extensively used as a tool in stabilization policy. A typical feature of the policy is that a vast variety of methods have been used—discount rates, open market operations, cash reserve requirements, liquid asset ratios, other portfolio ratios, ceiling on bank advances (1955–57) and bond issue control. The increased reliance on monetary policy during the last decade, particularly to fight inflation, is indicated by the increased fluctuations in interest rates, on a rising trend (Chart 5). Another indication is that the "real liquidity" of the private (non-bank) sector has fallen considerably during periods of tight monetary policy.[40] It is also of interest to notice that interest rate policy in later years has been more and more motivated by balance of payments considerations. While long– and medium–term capital movements are subject to exchange control, there seems to be a belief among monetary authorities that short–term capital movements, such as trade credit, are rather sensitive to interest rate policy.

In spite of much higher interest rates in the boom of the Sixties than in the boom of the Fifties, the degree of credit rationing seems to have been severe also in the Sixties. An explanation is that the real interest rate after tax has not been raised as much as the nominal interest rate before tax. In fact, when profit taxation is about 50 per cent, interest costs are deductible, and people have reason to expect a yearly price rise of 3 or 4 per cent, the real interest rate after tax in Sweden is scarcely above zero.[41] Thus, the real interest rate after tax is rather lower than in the depression of the Thirties. It is therefore not surprising that excess demand for credit has been considerable in boom periods.

### B. *Critique of the Policy of Credit Rationing*

By the shift to restrictive monetary policy in the middle of the Fifties, still at rather low interest rates, the previous excess demand for commodities and labor was succeeded by excess demand in the credit market. The second half of the Fifties must, however, be regarded as a fairly successful period for stabilization policy in Sweden. Nevertheless, many economists were somewhat unhappy about stringent credit

[40] Real liquidity is here defined as the real value of "liquid assets," held by households and firms, as a fraction of their income or expenditure.

[41] An interest rate of 8 per cent and a rate of expected price rise by 4 per cent make the real interest rate after tax about 0 per cent. If the wholesale price index, which during the last ten years has risen by about 2 per cent, is instead used as deflator, the real interest rate after tax will be about 2 per cent. It should be added that uncertainty is attached to price expectations.

rationing at low interest rates as a permanent solution for monetary policy in boom periods. Thus, considerable criticism was directed against the policy particularly by Erik Lundberg, Bengt Senneby and Bent Hansen.

The Lundberg–Senneby criticism [98] went along two main lines:

(1) Control of the volume of credit issued by credit institutions may be a poor instrument for monetary policy due to the fact that the relation between the credit volume and aggregate demand (for commodities and services) is rather weak. In particular, Lundberg and Senneby emphasized that a given aggregate demand in the economy can be combined with a varying volume of credit, depending, for instance, on how saving and investment are distributed between households, firms and government. For instance, the greater the fraction of saving performed by households and government, the larger the volume of credit necessary in order to transfer financial surpluses to the business sector from the other sectors. Moreover, the more the distribution of saving deviates from the distribution of investment *within* the business sector, the larger is the credit volume necessary to finance a given investment program. (This problem concerning the relation between, on one hand, the distribution of saving and investment, and on the other, the credit volume had earlier been thoroughly analyzed theoretically by Börje Kragh [63, ch. II].) Lundberg and Senneby also argued that in a process of "profit inflation," a rise in investment might, in fact, be compatible with a *reduced* credit volume. On the other hand, in a deflationary situation, with a rise in unplanned inventories, the demand for credit might have to rise to carry the increased inventories and at the same time to finish already started investment projects.

Their conclusion seemed to be that the credit volume is both a poor *instrument* of economic policy and a poor *indicator* of the effects of monetary policy. This recalls Bent Hansen's arguments against regarding the budget surplus as a tool, or an indicator, of fiscal policy: the volume of credit as well as the budget balance is an endogenous variable, which is strongly influenced by a number of different parameters as well as by other endogenous variables.

(2) Reliance on credit rationing rather than high interest rates could in the long run be disruptive to the allocation of resources. The idea was, of course, that in the allocation of credit, considerations of profitability were often replaced by other types of considerations, such as traditional relations between lenders and borrowers (for instance one firm lending directly to another) and, in the case of the control of bond issues, by the turn in the queue at the central bank (and at the private banks when the central bank left them to administer the queue). There was also a risk of compartmentalization, i.e. of dividing

the credit market into a number of submarkets with quite different interest rates in each market, and also a risk that firms with large internal funds, due to a good *historic* profit record, would be induced to invest internally in low profit projects rather than supply the funds in the credit market.

Lundberg and Senneby concluded that a flexible interest rate policy was desirable both from the point of view of stabilization policy and from the point of view of allocation of resources. They admitted, however, that a sudden reduction in the volume of credit, or a credit freeze, may be efficient as a short run brake on an acute investment boom, even if the connection between the level of credit and total expenditure is rather loose. The disadvantages of the method would, however, in their opinion, increase with time. These arguments were later further developed by Lundberg in a study of investment criteria and rates of return in Swedish business firms [88, ch. 10]. The great differences in rates of return, "required" as well as actual, that were found in this study, Lundberg connected with the imperfections in the credit market (to a large extent a result of the monetary policy), with the high degree of self–financing in the business sector, and with the primitive calculation methods employed by many firms.[42]

Bent Hansen, too, was willing to accept a credit freeze as a short-run device in an acute investment boom [40]. His criticism of the policy particularly emphasized that flexible interest rates would give the credit market better properties as a built–in stabilizer than it would have as a regulated market with a loan ceiling. Hansen tried to show this by a number of examples of disturbances in the economic system, with a credit market with flexible interest rates in one case and with pegged interest rates and a controlled credit volume in the other case. One of Hansen's examples was a situation in which household saving increased and, as a consequence, business income tended to fall. In such a situation, a flexible credit market would automatically transfer increased saving into credit supply, partly long–term. The lower interest rates would induce an increase in fixed investment and also help firms to ´ carry additional inventories, which would be favorable from the point of view of economic stability. If the volume of credit was fixed in such a situation, no such built–in stability effects in the credit market would help to restore the stability of output.

Whereas Lundberg–Senneby and Hansen gave arguments for a freer interest rate policy in general, Guy Arvidsson developed a proposal for reconciling controlled interest rates on "priority credit" (mainly government securities and housing loans) and free and flexible

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[42] The existence of rather primitive calculation methods by Swedish firms, implying in fact a very high time-discount, is confirmed in a study by Renck [138].

interest rates on other types of credit ("private loans") [5, pp. 123–27]. The technique—well-known from discussions in other countries—would be to isolate the markets for government securities and mortgage bonds by portfolio rules for credit institutions. The main original idea in Arvidsson's proposal was to create incentives for banks to charge "equilibrium" interest rates on other types of credit, either by high cash reserve requirements or by high interest rates on bank deposits, and possibly also by taxes on deposits. Such actions would also, if properly adjusted, keep down the profits of the banks, in spite of high loan rates.

### C. *Lessons of Swedish Monetary Policy Experience*

Besides the general problems connected with severe credit rationing, what have been the main lessons of monetary policy experiments in Sweden?

First of all, it has proved difficult to pursue a tight monetary policy without flexible interest rates. This is presumably the reason why a flexible interest rate policy has become more and more accepted. Of course, such difficulties are predicted by theoretical considerations. The occurence of queues, tendencies to "grey" markets and difficulties in finding efficient criteria for the distribution of credit are effects of price control and rationing that can be inferred from the simplest type of price theory. Cash reserve requirements and liquid asset ratios also give rise to obvious problems. For instance the effectiveness of cash reserve requirements is impaired if banks can go on expanding private loans by unloading their holdings of government securities. This may be a problem even if interest rate flexibility is accepted, but the problem becomes of course particularly severe if banks are able to obtain additional cash reserves via central bank purchases of unloaded government securities, necessary to the pegging of the interest rate. In fact, it might be necessary for the authorities to accept such a decline in bond prices that expectations of a future rise develops, thereby creating expectations of large future capital gains from continued holdings of government securities (the "locking–in argument").

It was mainly this problem of the unloading of government securities by banks which induced the Swedish monetary authorities to rely on liquid asset ratios (secondary reserve requirements) rather than cash requirements as a tool of monetary policy. However, secondary reserve requirements are also afflicted with severe problems. One such problem is that it is difficult to fix the rules so that the bulk of banks' holdings of government securities is efficiently locked in. Because of the unevenness of holdings among different banks, some of them may have excess liquidity and they will in fact be more willing to sell out when liquid

asset ratios have been raised than if instead interest rates had been raised via open market operations. Moreover, in a system with very few banks (branch–banking), such as that in Sweden, an individual bank can usually expect that at least part of the deposits created by purchases of government securities will wind up as deposits in the bank itself. This means that if the bank buys government securities, the capacity of the bank to increase its supply of *private* loans will in fact increase (as the amount of actual liquid assets then will increase by a larger amount than "required" liquid assets).

Thus, whereas a main problem with cash reserve requirements is that banks can avoid the intended consequences (on the supply of private loans) by selling government securities, they can avoid the consequences of liquid asset ratios by buying government securities instead. Theoretically these difficulties could be mitigated by successive increases in cash reserve requirements and liquid asset ratios. However, such policies require considerable skill to be successful.[43]

A special motive for secondary reserve requirements has been to induce banks to supply housing loans to an amount consistent with the house–building plans of the authorities. The government has not as a rule, particularly not in the Fifties, accepted interest rates on housing loans high enough to induce capital market institutions to satisfy the demand for housing loans. Instead the monetary authorities have tried to guarantee credit to housing, by including mortgage bonds among legal secondary reserves, and also by voluntary agreements with credit institutions.

However, in spite of the attempts to persuade the capital market institutions to hold mortgage bonds, crises in the financing of house–building have occurred from time to time (e.g. in 1966), with the result that house–building plans have not been fulfilled, apparently partly because of a lack of housing credit. But in the Swedish system, with most house–building partly financed by the government, and with secondary reserve requirements for credit institutions, it would not be difficult technically to solve this financing problem. The conclusion must therefore be that, apart from some technical deficiencies in policy, the authorities (the government and the central bank) have not been willing to enforce the original house–building plans of the authorities themselves, presumably due to the lack of real resources in inflationary boom periods (such as 1965–66).

If the focus of our interest is switched from monetary policy to monetary theory, what are the main features of the theory of monetary policy in Sweden? Naturally, in the theoretical discussion, too, there has

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[43] A discussion of various problems connected with cash reserve requirements and liquid asset ratios is found in A. Lindbeck [77, chapt. 7].

been a considerable emphasis on the availability of credit, and hence on the behavior of lenders, rather than on the interest rate as a cost factor. The Swedish version of the availability theory was originally developed in the late Forties by private bankers, educated in economic theory, such as Jacob Wallenberg [164] [165], Ernfrid Browaldh [17], and Lars-Erik Thunholm [159] [160] [161]. A typical element in their approach was to regard credit supply as a necessary, but not sufficient, condition for the inflationary process that was going on. Even though they believed that certain long–term investments were sensitive to interest rates, they argued that the most important effects of monetary restraint was due to stiffer credit standards and more severe credit rationing. The effects on spending and lending of a fall in the capital value of assets were also a part of their theory, as was an asset–effect of a change in the quantity of money: "you do not save on what you have in surplus–money" [165, year 1950].

Erik Dahmén, in an article in 1952 [18], systematized and elaborated the ideas of this Swedish availability approach. In addition to clarifying various points about the exercise of credit standards, and the importance of availability of credit for investment expenditures, Dahmén in particular stressed the increased liquidity preference among banks and firms in a situation when the future availability of funds becomes more uncertain due to a discontinuation of the policy of pegging interest rates. Assar Lindbeck [77, chs. 3, 7] later tried to clarify the distinction between interest rate effects and availability effects. One conclusion was that it may be misleading to treat credit availability as something completely distinct from interest rate effects. If a loan applicant is refused (further) loans from one lender, he may turn to others, provided he is willing to pay the interest rates required by these. Thus, only when a loan applicant is refused credit in the section of the credit market with the highest interest rate in the whole market is it possible to refer rigorously to credit availability effects as something completely distinct from interest rate effects. This does not mean that references to "availability of credit" are nonsense. It only implies that credit availability *in particular channels* has to be analyzed simultaneously with interest rate effects.[44]

Apparently, many of the ideas by Swedish bankers in the late Forties recall the American availability theory, as developed in the beginning

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[44] An econometric attempt has been made by Gunnar Eliasson to study the effects on investment of various monetary and financial factors [26]. According to this study investment expenditures are considerably influenced by the access to the bond market and also by the availability of liquid assets of firms. Eliasson did not obtain any indication of influence on investment expenditures of the volume of commercial bank advances. (Eliasson used a combination of an accelerator- and residual-funds model, somewhat similar to a model by Meyer and Glauber [107].)

of the Fifties by economists connected with the Federal Reserve System ("the Roosa doctrine"). There are some differences between the two availability theories, however. One such difference is that the Swedish availability theory did not, like the American version, focus so much on the effects of *very small* interest changes for government securities on the supply of private credit. (It was argued in the American availability theory that the *cross* elasticity of supply of private credit with respect to interest rates on government securities is high [76].) Dahmén may be regarded as an exception; and he referred explicitly to the American availability theory. Rather than focusing on the effects of interest rate changes on the supply of private credit, the main idea in "the Swedish Availability School" was to regard the supply of private credit as a function of bank reserves—the well–known idea of credit expansion multipliers. In the policy–oriented part of the Swedish availability debate, the focus was to a large extent on "direct" (quantitative) ways of controlling the supply of credit—secondary reserve requirements, portfolio management regulations and ceilings on bank advances.

It is also of interest to note that monetary theory in Sweden has usually attached very little importance to the quantity of money. This is an old tradition dating from the time of Wicksell, who emphasized interest rates and not just the quantity of money. Lindahl [71] went much further along this line; in his monetary theory, the quantity of money hardly entered at all. The same can be said about Ohlin's loanable funds approach, in which the effects on the real sector were transmitted only via interest rates [126]. Ohlin, as well as other economists of the Stockholm School, energetically criticized the quantity theory of money by arguing that the volume of money did not directly influence spending plans. In the same tradition, money is not introduced in Bent Hansen's theory of inflation [39].[45]

As credit supply rather than the quantity of money has been regarded as the strategic variable for monetary policy, the emphasis in policy has been on the asset side of the credit institutions' balance–sheets, rather than on their liability side. Consequently, it has been regarded as important to control *all* credit institutions, not just commercial banks. In this respect, Swedish monetary policy thinking has followed the same lines as the British Radcliffe Report. In accordance with this tendency, studies of the credit market in Sweden have dealt with the entire flow of credit funds in the economy, with the help of credit matrices, rather than confined the interest to commercial banks. This work has been performed mainly by Guy Arvidsson [1], Börje Kragh [64] [66] and Erik Karlsson [58].

[45] For a critical examination of the quantity theory see Hugo Hegeland [48A].

VIII. *Long–Term Planning and Allocation of Resources*

A. *The Long–Term Reports*

In Sweden as in other West–European countries, public documents about the long–term tendencies of the economy have been presented regularly during the post–war period [183]–[187]. Five such documents, so called long–term reports, have been published (usually by specially appointed committees), the first report appearing in 1948 in connection with the Marshall Plan. The leader of this work has been Ingvar Svennilson, except for the last report (in 1966) which was produced by a division of the Ministry of Finance, headed by Erik Höök.

The long–term reports in Sweden may be regarded mainly as forecasts, rather than plans.[46] They deal with the development of the basic sectors of the Swedish economy during the forthcoming five–year period and are based on detailed inquiries and discussions with representatives of firms and organizations in the private and public sectors. Thus, a considerable exchange of information between representatives of the various sectors of the economy occurs during the course of the work on the report—before it is published. On the basis of this information, the long–term committee tries to construct a consistent projection for the economy, or to discuss remaining inconsistencies in the various plans, which have to be solved either by the market mechanism or by government economic policy. These inconsistency tests were rather fragmentary in the early report, but have become more explicit and complete in later reports, partly due to the use of simple aggregate production functions (or at least capital/output and labor/output ratios) and, to some extent, input–output tables. The authors have stressed that the figures should be continuously revised in the light of new information—a kind of "rolling" forecasting. Actions in the short–run, to quote Sevennilson, have to be regarded "as the first step in a *strategy,* which includes different long–run alternatives of acting" [153, p. 165]. Thereby a flexibility in the planning may be achieved: "we should not make our valuations norms for future generations" [153, p. 171]. Svennilson has recently suggested that such alternative projections should be made for quite long periods, such as 25 years, and that the work should be interdisciplinary rather than confined to economists [153, pp. 168–71]. By the help of Börje Kragh's earlier mentioned studies of trends concerning financial surpluses and deficits in various sectors, it has also been possible to study the consistency of the trends in the real and financial sectors of the economy.

The reports can perhaps be characterized as a modest type of "indic-

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[46] For a presentation of the general approach in Swedish long-term reports, see I. Svennilson [148] [149] [150].

ative planning." However, in contrast with the early French plans, no fixed production targets have been formulated in the reports, and there have been no attempts to force the private sector to conform to the figures in the reports. In fact, the government as a rule has not even adopted the reports as official government policy. The documents may mainly be regarded as a method of communicating information about activities in various sectors of the economy, whereby information obtained from markets is amplified. It is also widely believed that the publication of the reports creates confidence in the growth process, and facilitates a sustained growth of the economy.[47]

Besides transmitting information about plans and problems, and making consistency tests, the committees have to varying degrees made economic policy recommendations on the basis of certain value judgments. Sometimes these value judgments seem to be based on the subjective values of the committee members themselves, sometimes on what the committee believes are the dominating political valuations of society. These recommendations have above all dealt with the "desirable" saving ratio for the economy and with the allocation of resources among very broad expenditure categories, such as private and public consumption and investment.

## B. *The Optimum Savings Ratio*

As a rule the long-term committees have found that investment plans (or "requirements") are much larger than expected (*ex ante*) saving with an unchanged economic policy. This has usually led the committees to argue for a higher investment ratio in the economy and to suggest heavier taxation of private consumption.

In the first three long-term reports—1947, 1950 and 1955—the argument for a higher saving ratio was not explicitly tied to the question of the growth rate of the economy. The main argument was instead to bring about macro-economic and sector *equilibrium* via an increase in output capacity in certain sectors. In particular, the purpose of the increased capacity was to restore equilibrium in the balance of payments (the 1947 report) and equilibrium between demand and supply in certain capital-intensive sectors where equilibrium pricing was not ac-

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[47] Compare the following passage by Svennilson: "It has not been part of the Swedish planning process to go back to the various economic units (after collecting data) and negotiate a revision of their plans according to the integrated national perspective. This would be regarded as an unsound intervention in the competitive system. Firms and sectors are expected to adjust to the market development that actually follows, guided by the information they receive in the published national projection . . . The national projection creates an 'image' of economic growth that has a backing in Government policy. This 'image' will stimulate industry to plan for its long-term expansion and make it possible to do it more realistically. In this way national projections may contribute to create a better balanced economic growth" [149, pp. 195–96].

cepted—mainly housing and the public sector (the 1950 and 1955 reports).

Not until the 1959 report did the growth rate of the economy as a whole come to the forefront of interest. The growth problem was then largely analyzed as a problem of intertemporal allocation of aggregate consumption, i.e. as a problem of achieving an optimum time profile of aggregate consumption. On this approach, not only the conventional investment ratio but also the volume of resources devoted to education and technological research and development came into focus—ideas well in line with the international discussion of growth at that time. Ingvar Svennilson in particular, underlined the importance of these factors for economic growth.[48]

This stress on the educational and technological factors is one of the reasons why the 1959 report, in contrast with the earlier ones, did not argue for a further increase in the investment ratio. However, the committee also seemed to be somewhat doubtful whether it was reasonable, from the point of view of social values, for the present generation to give up additional consumption opportunities to the advantage of future generations, when the latter would anyway be very well off compared to the present generation. As Ragnar Bentzel asked provocatively in a memorandum [14] to the 1959 report: "What are the motives for such a redistribution of consumption? Would not this be to take from the poor and give to the rich?"

In the international theoretical literature of recent years on the optimum saving ratio, the problem has usually been formulated as a question of maximizing aggregate consumption within a finite, or infinite, horizon (with time discount), or alternatively as the problem of reaching a saturation level of wants ("bliss") within a minimum of time. Bentzel has tried to find a more operational approach to the problem by making the optimum saving ratio of the economy a function of the expected remaining lifetime, and hence the age distribution, of the population. The basic idea is that only young, and possibly middle–aged, people have anything to gain from an acceleration of the growth rate achieved by a reduction in the present consumption ratio. Bentzel therefore suggested that the optimum saving ratio for the economy can be determined if we simulate a hypothetical voting procedure among

[48] [146] [147] [148] [151]. It might be added, however, that Swedish studies on the production function indicate a greater importance of capital accumulation than studies in countries such as the US and Norway. According to a study by K. G. Jungenfelt [57], about 55 per cent of the rise in labor productivity in the post-war period was due to the accumulation of capital (the "technological" trend-factor being responsible for about 45 per cent). Also in a study by Erik Lundberg [88, pp. 126–29], 55 per cent of the increase in labor productivity was explained by capital accumulation. Because of the "embodiment" of new technology in new capital goods, Lundberg argued that an even higher fraction of the productivity increase should be attributed to capital accumulation.

the entire population, where everybody is assumed to vote in accordance with his self–interest. His vote then will depend on the length of his expected remaining life.

Let us assume that all investment projects can be ordered according to (falling) social rates of return. For a given investment project to be worthwhile to an old person, a very high rate of return is required, as otherwise future income increases would not, during his remaining lifetime, add up to a value larger than the investment cost. Now, it is easy to calculate the relation between the length of the remaining lifetime of a person and the lowest rate of return that is necessary to compensate him for the reduction in disposable income that is required today (and in the near future) to finance the project. On this basis we can determine the median value of the lowest rate of return required by members of the population; it is equal to the lowest rate required by people in the age groups representing the median age of the population. (For the half of the population which is younger, a lower, and for the half of the population which is older, a higher rate of return is required.) With the help of an aggregate production function for the economy, Bentzel finally determined the optimum saving ratio for the economy, consistent with this rate of return.[49]

Though both simple and ingenious, Bentzel's analysis of course raises a number of problems. In particular, the political leaders may have quite different evaluations of the desirable consumption profile over time than that obtained from Bentzel's hypothetical "voting procedure," based on assumed individual preferences.

## C. *The Deficiency of Criteria for Allocation Policy*

The allocation of resources has changed substantially in Sweden in the post–war period. The investment ratio (gross investment relative to GNP) has, quite in line with the recommendations of the long–term

[49] Bentzel used a Cobb-Douglas production function of the following form (for a stationary population)

$$Q = K\, e^{at}\, k(t)^b$$
where $k$ is the capital stock. $a = 0.02$, $b = 0.25$.

On this basis Bentzel finds the following relation between the remaining lifetime $(x)$, the lowest acceptable rate of return $(r)$ and the optimum saving ratio $(s)$

| | | |
|---|---|---|
| For  $x = 20$ | $r = 6.6\%$ | $s = 10\%$ |
| For  $x = 25$ | $r = 5.6\%$ | $s = 12\%$ |
| For  $x = 30$ | $r = 5.0\%$ | $s = 14\%$ |

It should be observed that $s$ refers to *net* saving ratio. Thus, assume that the median age of the population is 40 and that the expected remaining lifetime for an individual in this age group is 25 $(x = 25)$, then the lowest rate of return that is acceptable to a majority of the population is 5.6 per cent, corresponding to a net saving ratio for the economy of 12 per cent.

reports, risen from about 18 per cent in 1950 to 25 per cent in 1966 (according to OECD definitions). This increase has occurred at the expense of private consumption, which has fallen from about 67 to 57 per cent of GNP (OECD definitions).

At the same time resources have been shifted from the private to the public sector. The government budget now amounts to nearly one third of GNP, as compared with nearly one fifth in 1950. At present, public consumption forms about 21 per cent of total consumption (compared with 14 per cent in 1950)[50] and public investment about 36 per cent of total investment (as compared with 32 per cent in 1950). As house–building takes an additional 20 per cent of total investment resources, the private sector has the responsibility for about 44 per cent of the investment activity in the economy. However, in the industrial and banking sectors, private enterprise dominates entirely. At the present time only about 5 per cent of industry and 5–10 per cent of banking are publicly owned in Sweden, which is rather less than in most West European countries.[51]

The discussion of the allocation of resources in Sweden has to a large extent been concerned with aggregate variables such as the growth rate of GNP, total availability of labor and capital, the investment ratio, the (ex ante) saving ratio, and the balance of payments, etc. This characterization holds also for the long–term reports, which broadly speaking, may be described as short–run national budgets extended to a five year basis. Problems of the "optimum" allocation of resources have been discussed very sparingly, except for the "consistency test" earlier mentioned and the usual advocacy of a higher investment ratio. However, the long–term reports have sometimes made somewhat more detailed recommendations. Thus, on some occasions priority has been advocated for investment in housing and public services, such as schools and hospitals (in the 1950 and 1955 reports). Sometimes priority has been recommended for investment in industry (in the 1947, 1959 and 1965 reports). In certain instances, priority has been advocated for investment in the commodity–producing sectors (in the 1947 and 1959 reports). And on some occasions priority has been recommended for the service sector, such as department stores and distribution in general (the 1955 report). A general pattern seems to be that a sector that has been discriminated against in one report has usually been favored in

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[50] This is actually an underestimate of the volume of public consumption, in the sense that the capital costs are not included in the measures of public consumption, which are based on labor costs only.

[51] The figure for industry refers (roughly) both to employment and value added, whereas the figure for the banking sector refers to the value of assets. Some increase in the public share of banking is bound to occur in the near future due to the creation of a new state-owned "investment bank" in 1967.

some of the next reports (except private consumption, which has never been very much favored).

A reason for this rather modest treatment of allocation problems is presumably that it is difficult to find reasonable criteria for detailed recommendations in an economy characterized by fairly free international trade and adherence to the principle of "consumer sovereignty." Practically no attempts have been made to evaluate the allocation of resources arrived at via the market forces. An exception is a study by Lars Werin by an activity model à la Koopmans.[52]

A particular difficulty for detailed recommendations about interventions in the allocation of resources is that quite different price systems exist in different sectors of the economy. This means that it is very difficult to use market data on profitability or on demand pressure to draw conclusions about investment requirements in various sectors. If, as has usually been the case in the long–term reports, investment requirements are measured by the excess demand in various sectors, the investment "needs" will naturally always appear to be particularly large, not to say insatiable, in areas where the price is fixed at zero or very far below the equilibrium level. When this method of measuring investment requirements is used, the housing sector and large parts of the public sector will permanently seem to be undersupplied with resources compared to other sectors, where equilibrium prices prevail.

These problems might not be so difficult if it could be argued that consumer prices in these sectors are simply an expression of the valuation by the authorities of these commodities, compared to other commodities. In this case it would be rational to move resources, corresponding to the stimulated demand, to sectors with low prices. However, this is a dubious way of looking at the problem, as will be obvious if we ask how the low prices have come about in the different sectors. For instance, the high consumer prices for agricultural products cannot be interpreted as a low official valuation of food consumption; these prices are instead "unintended" effects of the present system of income support for farmers. And in the housing field, with existing rent control, the relative price of housing is simply a result of the rate of inflation; the more rapid the inflation, the lower will be the price of housing compared to other commodities. Without inflation, it is even possible that,

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[52] Werin's study is an attempt to find an optimum allocation of resources for Sweden by the help of an activity model with fixed input-output coefficients for variable factors, and with a given capital stock in each sector [169]. The optimum position according to this study, was surprisingly close to the actual allocation in Sweden, in the sense that the possible reallocation gain would be only about one half of a per cent of GNP. Presumably one reason for the result is that the input-output coefficient was taken from the actual production process in Sweden, which means that these coefficients were in fact assumed to be the optimum ones.

with the present stock of dwellings, there would not be any excess demand for housing at all. Moreover, if the demand for housing, stimulated by rent control, is regarded as an expression of the authorities' valuation of housing consumption, compared to consumption of other commodities, completely inconsistent valuations have been applied on the demand and the supply side; the authorities have never been prepared to move enough resources into the housing field to satisfy the demand stimulated by housing policy.

Not even the queues for public services, such as schools and hospitals, can, without a closer look, be taken as indicators that these areas are undersupplied with resources *compared to other sectors*. For in these areas, the queue–method has consciously been chosen as a method of distributing the services, rather than reliance on the price mechanism. This means, of course, that the existence of a queue, or its length, does not tell us whether this sector is discriminated against or not in the allocation of resources. If queues in certain sectors, as for schools and medical care, are regarded as a better way of distributing a commodity than relying on individual choice in a market with equilibrium prices, than queues have to be accepted as more or less permanent phenomena in these sectors. Consequently, it is necessary to use considerations other than the length of a queue, such as social profitability analysis or cost–benefit analysis, to determine the appropriate allocation of resources.

Thus, it is extremely difficult to find reasonable criteria for an appropriate allocation of resources in such a "dual economy," with equilibrium prices in the private sector and controlled prices with permanent excess demand in housing and public services. Not only do we lack information about the demand curves for the various types of public services (and housing) but the demand curves in the other sectors are influenced by the price policy in the controlled sectors. (Another problem in the public sector is, of course, how to find criteria and create incentives for efficiency, when there is no market test of the performance of the institutions.[53])

The importance of these problems is indicated by the present size of the price controlled sectors. The bulk of public consumption falls on services for which prices are zero or extremely low (such as education, hospitals and administration), and about three quarters of public investment goes to sectors where market pricing is not used for final output, such as research, education, defence, roads, hospitals, and social work. To this we have to add the housing and agricultural sectors, where prices are controlled.

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[53] There is a rising interest among young Swedish economists in research on efficiency and cost-benefit problems in the public sector.

## D. *Interventions in the Allocation of Resources*

Apart from the expansion of the public sector in the field of services, what have been the main government interventions in the allocation of resources in recent years? First of all, there are, as in practically all countries, a number of sales taxes on so-called luxury commodities (furs, cosmetics, etc.) and "unhealthy" commodities such as liquor and tobacco, as well as subsidies for cultural activities, such as theatre. Secondly, as already pointed out, investment controls have been used from time to time not only to dampen total investment demand, but also to discriminate against some sectors. Moreover, monetary and fiscal policy tend to be discriminatory in various ways, even when this is not intended. One example is the heavy reliance on credit rationing, another the favoring of firms with a good *past* profit record in investment funds policy.

Another kind of intervention in the allocation of investment is the localization policy initiated in 1962–64, for the purpose of stimulating industrial development in the northern parts of the country. The technique has involved government loans on favorable terms and direct subsidization of investment costs, amounting to a maximum of 30 (or in exceptional cases 50) per cent of total investment costs. During the period 1963–66 investment financed in this way counted for about 15 per cent of total industrial investment in building and 5 per cent of investment in machinery in Sweden. The purpose of the policy has mainly been to dampen, or possibly stop, the outflow of labor from the northern part of Sweden, an outflow that was accelerated by the mechanization of forestry and by a contraction and rationalization of farming in the northern parts of the country. The policy was initiated in response to the severe criticism, mainly by people in the northern parts of the country, of the labor mobility policy, which facilitated the movement of labor out from the northern regions. The official motivation for the regional development policy seems to have been a mixture of two mains ideas: (1) that the northern parts of the country have natural handicaps which, mainly for social reasons, have to be compensated by subsidies, and (2) that external economies will be created in the northern parts of the country. It would seem that the former idea has dominated the policy so far, as the support of investment in the northern regions has been dispersed over a very large number of geographical locations.

The regional development policy has been further supported by the investment funds policy. Releases of such funds have been made, even in typical boom periods (such as in 1965 and 1966), for firms willing to invest in the northern parts of the country. In fact, large industrial firms have been allowed to use investment funds in typical boom peri-

ods in the southern and central parts of the country, provided that some part of the funds (usually only a very small fraction) was used in the northern parts. This use of investment funds has, to some extent, undermined the efficiency of investment funds policy as a tool for stabilization policy.

It is interesting to note, moreover, that whereas it is labor that is regarded as the abundant factor and capital as the scarce in the northern parts of the country, the policy has chosen to subsidize capital rather than labor, thus stimulating capital–intensive production technique, and even the substitution of capital for labor in existing firms. This means that the employment–creating effects will be smaller than if labor costs instead had been subsidized.[54]

Other types of intervention in the allocation of resources are found in the price controlled sectors, above all housing and agriculture. Housing policy in Sweden in the post–war period has been inspired mainly by the experiences of the Thirties and by the expectations of a post–war slump. Consequently, the policy has been designed to stimulate the demand for housing. The two main tools have been general subsidies (mainly of interest costs) and rent control. Due to the combination of rent control and inflation, the relative price of housing (as compared to other consumer goods prices) has fallen by about 25 per cent since the end of the Thirties, when the housing market was in equilibrium (though the *housebuilding* market was then characterized by "excess profits"). In spite of a very high rate of housing production (one of the highest in the world on a per capita basis) the policy has resulted in a vast excess demand for housing—a "housing shortage." At the present time, the waiting–time in the official queues for apartments is about 4–8 years in Greater Stockholm and about 2–4 years in medium-sized expanding towns. (During the last year it has become possible, however, to get the most expensive apartments at shorter notice.)

The main inspiration for the housing policy in Sweden in the post–war period has been the work of Alf Johansson, who has stressed the importance of demographic factors behind the demand for housing, and minimized the possibility of achieving equilibrium in the market via higher rents. Other economists in Sweden participated very little in the housing policy debate during the first fifteen years after the war.

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[54] The new emphasis on location policy has stimulated research in regional economics considerably in recent years. The pioneering works in the theory of regional economics in Sweden are B. Ohlin [123] and T. Palander [130A]. In the post-war period the emphasis has been more on empirical problems, such as in the works by R. Artle [10], P. Holm [50], G. Törnqvist [163] and F. Kristensson [66A]. Only minor attempts have been made by Swedish economists in recent years to analyze the principles of location *policy,* e.g. A. Lindbeck [78].

An exception was Sven Rydenfelt, who, in heated debates with Alf Johansson at the end of the Forties, argued that the rent control was responsible for the housing shortage, and that the shortage could not be removed without higher and more flexible rents.[55] A similar attack on Swedish housing policy was made at the beginning of the Fifties by Eli Heckscher in a couple of newspaper articles [47] [48].

The official policy, like Alf Johansson, has instead for twenty years maintained that the housing shortage could be removed, within a few years, by large production of new houses, and that higher rents either cannot remove the shortage, or are undesirable for various social considerations, such as the effect on the distribution of income and on housing consumption. Alf Johansson has also argued that fluctuations in rents would be detrimental to new construction, by raising costs and creating building crises from time to time. He also argued that "high" equilibrium rents would result in a concentration of new construction on smaller apartments than he considers suitable from a long-run point of view.

In more recent years, the interest in housing policy among economists has increased considerably. An example is an analysis of the effects of rent control by Bentzel, Lindbeck and Ståhl [15].[56] The essence of their analysis was to try to show that the goals behind rent control—such as a high volume of new construction and a reasonable distribution of income and housing consumption—could in fact be more efficiently reached *without* rent control, by the application of various taxes and subsidies to a market with equilibrium pricing. Bentzel, Lindbeck and Ståhl also analyzed various "non-desirable" effects of rent control, such as the abolition of "consumer sovereignty" and the absence of real market tests of newly produced dwellings in a situation of large permanent excess demand. They also stressed that incentives to efficiency in housing production are minimized when everything can be let out regardless of cost and quality, that the stock of houses deteriorates due to lack of incentives to make repairs, and so forth. Another basic point was that the principles used to distribute housing consumption between households become rather dubious from a social point of view in a market with a permanent shortage, as housing consumption is mainly determined on historical grounds; those who happen to sit in a particular apartment are allowed to keep it at unchanged rent no matter how highly other people, without an apartment, evaluate it. In fact, the usual way to get an apartment in Sweden seems, according to sketchy

[55] The official policy was outlined in government reports, largely written by Alf Johansson. The main document is [189]. For the discussion between Johansson and Rydenfelt see [54] [140] [141] [142].

[56] See also Lindbeck [79] and Ståhl [144]. For a more formalized analysis of the housing market, see H. Dickson [22].

empirical evidence, to be via relatives, friends, and employers rather than via the official queues; the black market also seems to play an important part.[57] (It should be noted that only about 30 per cent of total yearly production of housing consists of residential houses.)

The rent–control policy has in recent years been defended, not only by Alf Johansson [55], but also by Per Holm and Bo Södersten. Per Holm [51] has stressed the same points as Alf Johansson, whereas Södersten [154] has stressed considerations of the distribution of income and wealth. He has mainly referred to the capital gains which in a market without rent control accumulate for owners of earlier produced houses because of increased land values and higher building costs.

Whereas one of the purposes of rent control has been to favor consumers at the expense of houseowners, the main purpose of the regulation of agricultural prices has been to achieve a redistribution of income from consumers to producers of agricultural products. The basic idea of the policy has been that prices should be used to guarantee a certain income level to farmers, whereas the efficiency of the sector should be stimulated by "administrative" measures—loans on favorable terms, technical advice, and government purchases and sales of land. Thus, an administrative process should partly replace the market mechanism.

The policy had undoubtedly succeeded in keeping up the incomes of farmers, by a support price which is now about 70 per cent above world market prices. However, the policy has been confronted with the same problem as in other countries: the agricultural sector has been uneconomically large and the transformation of its farm structure has been delayed. In twenty years, the average size of farms has risen by only about 4 hectars—from about 12 to about 16 hectars—while the optimum size of farms, according to studies by Lennart Hjelm [49], has risen from about 20–30 to about 100–200 hectars (in grains production). As a comparison, the average size of farms in the United States has risen from about 65 to about 120 hectars during the same period.

However, in spite of the heavy price support the incomes of the large number of farmers with very small holdings (2–10 hectars) have been so low in recent years, compared to income in other sectors that the outflow of labor has accelerated considerably (to about 5–8 per cent of the agriculture labor force per year). Thus, it seems to be mainly the amalgamation of farms rather than the contraction of the labor force that has been delayed.

Swedish economists have long participated in the agriculture policy debate. Myrdal in a study in the thirties [114] stressed that the diffi-

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[57] According to available empirical evidence, only about 20–25 per cent of those who have moved into apartments in recent years have obtained these via the official queues [79, p. 66].

culties of agriculture were not "temporary," but instead intimately connected with the transformation of the economy during a growth process. Consequently, he argued that the problems of agriculture could not be solved by subsidies only, but that a long–term policy should be designed with the purpose of facilitating the contraction of the sector. Agricultural policy in the post–war period has been founded mainly on the report by the 1942 agriculture committee, of which Erik Lundberg and Ingvar Svennilson were members. In a special appendix to the committee report, they argued that the majority of the committee were too little concerned with the efficiency aspects, price policy being completely tied to the income goal for the agriculture population [96]. Clas-Erik Odhner, economist for the Confederation of Trade Unions, in a number of books and articles has particularly pointed out that a contraction and improvement of efficiency of the agricultural sector is facilitated in a full employment economy, and that the case for heavy subsidies is for this reason weakened in such an economy [121] [122]. Odd Gulbrandsen and Assar Lindbeck, in more recent contributions, have tried to estimate the macro–economic costs of the agricultural policy, as well as the minimum costs necessary to reach the production goal of agriculture policy, i.e. to guarantee the food supply in the case of a break–down of foreign trade [30] [31].

A typical suggestion in most proposals by economists has been to rely more on deficiency payments and other types of transfers, labor mobility policy, retraining programs and measures to speed up the amalgamation of farm holdings—rather than to continue the heavy reliance on price support which has been characteristic of the agricultural policy pursued.[58]

An area, finally, where government interventions in the allocation of resources have been advocated by economists, but where very little has been done so far, is where severe external diseconomies exist, such as water and air pollution, noise etc. Erik Dahmén [21] has been the most energetic proponent of such interventions, mainly recommending fees and taxes à la Pigou.

## IX. *Present Problems and Policy Tendencies*

What are at present the basic problems and tendencies in the theory and practice of economic policy in Sweden?

Obviously, the dilemma of reconciling full employment and price stability is still with us. Some (new and old) aspects of the problem have been particularly evident in recent years—the role of the labor organizations and the effects of tax policy on wage formation. Another policy

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[58] Swedish agriculture policy discussions have greatly benefited from the econometric demand analyses for agriculture products by H. Wold and L. Juréen, e.g. [173].

issue of great present, and possibly future, concern is a tendency to acceleration of the rate of structural change of the economy. One aspect of this issue is the problem of the financing of capital formation, and hence the ownership of new capital. It may be worthwhile, in conclusion, to make some remarks on these two issues.

## A. *Full Employment versus Price Stability Revisited*

Whereas stabilization policy immediately after the war, in the period 1945–50, concentrated on cost considerations, i.e. on the supply side, the policy later on dealt mainly with demand aspects, in the usual Keynesian manner. (Labor mobility policy is an exception; in that field supply aspects have always played a great role.)

One example of the neglect of cost considerations in the policy of the last decade is the gradual increase in sales taxes as a method of fighting inflation, even in situations where the main problem seems to have been cost inflation rather than demand inflation (such as in 1962). Another example is the absence of attempts to pursue so called "incomes policy." There is a generally accepted idea (dogma) in Swedish economic policy discussions, that the government should not intervene in wage formation, but that the organizations should be left alone to manage these problems. This position is also energetically advocated by the organizations themselves. One basic argument for this standpoint is that the bargaining process in Sweden, which is very centralized, has a very good record with respect to peace in the labor market, though this has been to some extent bought by inflation.[59] Open conflicts have been very rare, and "wild–cat" strikes are practically non–existent. It is generally believed that the organizations would not feel the same responsibility for their actions if the government intervened in the bargaining process; it is also often argued that it would be difficult to gain support among union members for a policy of wage restraint if union leaders were not co–responsible for wages. However, it would seem that not even a rather centralized bargaining system, with three or four organizations on the employee side and two on the employer side, can avoid a rather rapid cost inflation.

As already mentioned, the dogma of non–intervention in wage formation has been challenged by some economists, such as Hansen and Östlind. Recently Svennilson also has suggested that the government should, to some extent, intervene in the bargaining process [152]. Like Hansen, Svennilson wants to use the government's power over the in-

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[59] According to conventional estimates, about half of the increase in wages in recent years in manufacturing and building industries, amounting to about 8–10 per cent per year during the sixties (Chart 1B), is classified as the result of negotiations, whereas the rest is called "wage drift."

come distribution to induce wage–earners to follow a less inflationary wage policy. However, whereas Hansen wanted to "bribe" wage–earners to accept wage increases in line with the wishes of the authorities, Svennilson's proposal is designed to remove the alleged wage–raising effects of progressive taxation. More specifically, Svennilson has suggested a combination of reduced tax progressivity (lower marginal tax rates) and smaller wage differentials (before tax). These two actions should be coordinated in such a way that the distribution of disposable income is unaffected (or possibly becomes more equal than at present). If an agreement to this effect were made between the government and the organizations, Svennilson argues, the competition for wage increases would be reduced, and the rate of wage inflation dampened. An additional advantage, in Svennilson's opinion, would be that disincentives connected with the tax system would be reduced.

Though interesting in principle, this proposal raises several problems. First of all, the incomes of employers and professional groups are determined outside the system of collective bargaining and would be difficult to include in Svennilson's system. Secondly, as the system requires that wages be reduced relatively more for qualified than for unqualified employees, wage costs would fall for the first group relative to the second. As a consequence, demand for qualified labor would increase at the expense of unqualified labor, with tendencies for the initial wage differentials to be restored after some time—particularly through wage drift.

It would seem that Svennilson's proposal rests on the assumption that the progressive part of the income tax is shifted by 100 per cent to wages; and that a *reduction* of the progressivity would be reshifted. This would mean that employees not only *try* to get 100 per cent compensation for progressive taxation, but actually succeed, which presupposes that the demand curve for labor is completely inelastic or that there is excess demand to begin with. This might be a realistic assumption in a short–run analysis for certain types of labor with small substitutability (specialists) such as in part of the public sector and among some business executives. The assumption seems rather unrealistic for other types of employees in the private sectors—particularly in the long run. Moreover, with respect to the problem of disincentives of progressive taxation, it is not clear how incentives to work can be raised by a reduction in tax rates that is balanced by a fall of the same size in wage rates, the reward for work on the margin being unchanged.[60]

[60] There is a possibility, however, that people not only react to the reward for work, but also "protest" against high tax rates by reducing the work effort. (In the latter case we

Svennilson wanted to dampen the alleged inflationary effects of attempts by the authorities to change the distribution of income. However, it has also been suggested in the debate that the allocation policy —the attempt to reallocate resources toward the public sector—has inflationary effects. The idea is that labor market organizations have tried to "retaliate" not only against progressive taxation but against tax increases in general. This is another case where fiscal policy has been criticized for focusing mainly on demand aspects.

In principle it is quite possible, of course, to eliminate the *demand effects* of an expansion in the public sector by raising taxes, provided these are raised more than expenditure (the marginal propensity to spend being less than unity). In a society with a labor market dominated by organizations, however, unions can try to retaliate, if they are not satisfied with the increase in private consumption that is "left" after decisions on public expenditure (and private investment). It seems as if such attempts to retaliate have been made. Average wage increases often have not been consistent with the political decisions about expenditure on goods and services—a point stressed by Erik Dahmén in particular [19] [20]. The result of these attempts by the public and private sectors together to obtain more than 100 per cent of national income has been a more or less permanent tendency to cost inflation. But as the fraction of national income going to private consumption has fallen steadily, the government has obviously to a great extent succeeded in its attempts to reallocate resources from private consumption to the public sector, though at the cost of inflation. Almost ten percentage points of GNP have been moved from private consumption to the public sector in the post–war period. Thus, it seems that even if shifting of higher taxation to average *nominal* wages has succeeded, the shifting has not succeeded in real terms: the public sector rather than the household sector has managed to sustain its spending plans in real terms.

An important aspect of the problem is that unions and other organizations largely have acted as pressure groups for higher public spending, housebuilding and to some extent also industrial investment. Thus, there seems, as Erik Dahmén has stressed, to be a kind of "inconsistency" in the behavior of the labor organizations as political pressure groups on one hand and as organizations appearing in markets on the other, presumably because of the struggle over income shares. No conceivable redistribution of income at the expense of capital owners would remove this inconsistency.

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may say that their "revealed preferences" between work and leisure are affected by taxation.)

An interesting example of attempts by unions to retaliate against taxation is the policy of academic professional unions (SACO) who want to bargain on the basis of income *after tax*, which means that they try to shift direct as well as indirect taxes to their wages. Another example of a conflict between union policy and public policy is that unions have, in fact, demanded compensation for price increases due to higher support prices for agricultural products, even though the unions politically have mainly supported the agricultural policy.

In conclusion, even if increased taxation is *necessary* to eliminate the demand effects of higher government spending in a full employment society, it may not be sufficient to prevent increased government spending from having inflationary effects through the income formation process. It is also possible that an increase in taxes, undertaken as an anti-inflationary measure, will in fact be interpreted by some politicians as an indicator of a "room" for reductions in other taxes or increases in government spending. This has led some people, such as Dahmén, to question the assumption in fiscal theory that the government can raise taxes without increasing expenditure too, possibly after a time–lag. It would also seem that the government has not fully considered that a parallel expansion of budgetary expenditure and receipts has expansionary effects (the balanced budget multiplier). All these experiences have led Dahmén to argue for a reformulation of fiscal theory, in which the effects of tax changes on organizations, as well as on politicians, would be integrated into the theory [19] [20].

Even though stabilization policy has concentrated on demand aspects, demand has not been restrained enough to prevent wage drift. In fact, during the Sixties the labor market has tended to be increasingly tight, at least up to 1965 (Chart 3). At a level of unemployment of about 1.5 per cent—with about the same amount of labor in public relief works and in retraining—it has proved very difficult to avoid excess demand for labor in certain sectors. Empirical evidences suggest that the rate of change of wages in Sweden is quite sensitive to the demand pressure in the labor market, particularly at low unemployment rates [53A].

It also seems that, typically, the demand restraining actions have been undertaken much too late in the booms, the 1963–65 boom being an example. When contractive actions on the demand side have been undertaken, the labor market has usually already become so tight that considerable wage increases have already taken place. The three–year bargaining agreement made at the beginning of 1966, just at the end of a very strong boom in the labor market, is an example. (The external trade deficit in 1965/66 indicates the very high "demand pressure" of the economy at that time.) Thus, even if the policy of the last decade to a large extent has followed the ideas of Gösta Rehn, the policy has

been more energetic in its attempts to increase labor market mobility than in keeping down aggregate demand, except possibly for the 1966–67 recession.

It has been argued by Erik Lundberg that the unemployed in a modern welfare state can get so much compensation that there is no severe drawback to being unemployed for short periods from time to time, an idea reminiscent of Galbraith's way of looking at unemployment some years ago [28, ch. 21]. Lundberg has suggested that the conventional unemployment concept should perhaps be replaced by the concept of "adult education and retraining," unemployment compensation payments being re–baptized "fellowships." By allowing a slightly higher statistical unemployment of this "fellowship" kind it might be possible for the authorities to cut off expansionary tendencies somewhat earlier in boom periods than has been the case so far. Thus, Lundberg seems to be consistent over time in his belief in the necessity of reducing the employment level to achieve price stability—though now without raising the level of "conventional unemployment."

There are, however, some severe limitations to the efficiency of the labor mobility policy. One is of a politico–psychological nature: the unfriendly attitude towards labor mobility policy in areas experiencing a heavy outflow. Another obstacle is the severe housing shortage, created by more than twenty years of rent control. It is quite possible that the reintroduction of a well–functioning housing market would be, at the present time, the most efficient way to increase labor mobility in Sweden.

A much discussed issue in stabilization policy is the policy–mix problem. The most striking changes in the policy–mix during the post–war period are presumably first the shift from direct controls to general monetary and fiscal policy during the Fifties, and secondly the ever heavier reliance on labor mobility policy since the late Fifties, in recent years in combination with location policy. However, whereas in the late Forties and early Fifties most critics argued for more reliance on general monetary and fiscal policy, and consequently for less direct controls, many people have in recent years found monetary policy "too restrictive." It is interesting to observe that some of those who were earlier the most eager proponents of monetary policy, such as Thunholm, now argue for a less restrictive monetary policy.[61]

The arguments for a less restrictive monetary policy vary, however.

[61] Gunnar Myrdal has consistently argued against "high" and widely fluctuating interest rates, expressing basically the same opinion as in his old classic "Höga skatter och låga räntor" [117] (High taxes and low interest rates). This reference is an early discussion of the policy-mix problem, with monetary and fiscal policy regarded as possible substitutes. The idea to replace interest rate policy by fiscal measures had in fact already been expressed by Carsten Welinder in 1942 [166, p. 40].

Some people have criticized credit rationing, but others (such as representatives of the farmers and pressure groups for housebuilding) have found the interest rate too high. Obviously these latter groups are thinking about the nominal rather than the real (deflated) rate of interest.

The difference between the nominal and real interest rate had led some people to propose the issuance of indexed bonds, i.e. loans with purchasing power guarantee, like those used in Finland and Israel. The arguments vary considerably, however. Some people seem to regard indexed loans as a way of raising the real interest rate, thereby giving savers compensation for inflation. Others, mainly Tord Palander and Guy Arvidsson, have seen indexed loans mainly as a way of reducing the real–value risks on loans. Hence, in the latter case the argument for indexed loans is to provide households and firms with assets free both of default risk and real value risk. Tord Palander, in a pioneering work on indexed loans [132] [133], has analyzed some of the consequences for monetary policy of a "dual market" for securities consisting of both indexed loans and conventional loans in money terms.[62] A government committee on indexed loans, with Guy Arvidsson as a member, has argued that the allocation of resources would improve if indexed loans were introduced, due to more uniform expectations about the real interest rate and smaller risks, which would minimize the need for diversification of assets to hedge against inflation. If it is found to be difficult to reconcile full employment and stable prices it is quite natural to try to reduce the disadvantages connected with unemployment and inflation. Lundberg's, Palander's and Arvidsson's proposals should of course be seen as attempts in this direction.

## B. *Structural Change and the Financing of Capital Formation*

The keener international competition—brought about by the liberalization of international trade, a fall in freight costs and the emerging industrialization of a number of new countries—has created a certain unrest in the economic policy debate in Sweden in recent years. One ex-

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[62] Palander [132] also suggested that the authorities can influence (commodity) price expectations by changing the difference between the interest rates in these two markets by open market operations. The idea is, of course, that the difference between the rates would reflect people's price expectations. This may be true for an economy without a public sector, or with a *given* stock of government assets (hence without open market operations). But it is difficult to see how a change in the rate differential, brought about by a change in the number of government assets outstanding, could influence expectations about the future rate of inflation in an unambiguous way. Moreover, as Arvidsson has pointed out, if the government, as suggested by Palander, eliminates the interest rate differential, the government would, as long as expectations about price increases dominate, have to buy ordinary bonds and sell purchasing-power bonds, which would be an exceedingly poor bargain for the government sector. Arvidsson [4, pp. 146–51].

ample is the demand for subsidies both to save old firms and to create new industries in contracting areas; the new regional development policy and certain selective uses of investment funds policy are cases in point. Another example is recent discussion of the desirability of providing government credit at favorable terms to shipbuilding, which is heavily subsidized in some other countries. Thus, the acceleration of structural change in the economy has created some tendencies to "neo–mercantilism" in Swedish policy. It is still too early to say, however, whether this is a temporary phenomenon or a new trend. From the point of view of principle, it is interesting to note, however, that the period of liberalization of trade by the reduction of tariffs and the removal of quotas may very well be followed by a period of selective subsidies. We may ask whether such a system cannot lead to even more "distortions" of national and international allocation of resources; tariffs are fairly "general" and "open" devices compared to most types of subsidy. A special explanation for the profit squeeze in part of Swedish industry in recent years seems to be that the domestic price level, as in a number of other countries, has risen much more rapidly than prices in international markets. For instance, whereas the GNP price deflator has increased by about 4 per cent per year during the last decade, prices of industrial commodities on international markets have, according to available statistics, risen by only one per cent per year. An interesting question is whether such a profit squeeze will be favorable to productivity and economic growth, by forcing the least efficient firms to close down and the remaining ones to increase their efficiency in order to survive and defend their profit positions. This type of mechanism is particularly likely in an economy, such as the Swedish one, where an "export–or–die" mentality is characteristic of a number of leading export firms, for the simple reason that the bulk of their production is sold internationally. If this hypothesis is correct, the productivity development would not be independent of the rate of wage increase, export prices being mainly given from abroad. This means that an incomes (or "guide–post") policy, designed to keep wage increases in line with the rise in productivity, is considerably complicated, as the productivity rise in that case cannot be taken as "given."

The acceleration of structural change in recent years has also aroused interest in the problem of the financing of capital formation. The apparent fall in profits and self–financing of industry during the sixties has accentuated the problem. Another reason for the new interest in this issue is an increased awareness in the political debate about questions of the distribution of wealth.

In this debate, the huge and rapidly expanding "semi–public" pension fund (the AP–fund) has become increasingly important. Some of

the basic questions in relation to this fund are: what has been the incidence of the pension contributions; how is credit supply influenced by the growth of the fund; and to what extent should the fund be deliberately used to influence the allocation of resources and the ownership of real capital in the economy? The importance of these questions is indicated by the fact that the fund now (1967) amounts to 15 per cent of GNP and is expected to rise to about 25 per cent of GNP in the beginning of the seventies. In fact, the growth per year of the fund (in absolute terms) is about the same size as the growth of the stock of assets of the entire commercial banking system; the yearly additions will soon amount to about 20 per cent of total gross saving (by OECD definitions).

The incidence of pension contributions is important both for the saving ratio and for the distribution of income. The more the pension contributions are shifted (onto wages and/or prices), and the less the decline in households' propensity to save due to the new pension system (i.e. the poorer the substitution of AP–pensions for other types of saving), the greater is the probability that the new pension system has resulted in an increase in the propensity to save of the economy as a whole.

The effects on the supply of long–term capital seems more clear–cut than the effects on saving. Whereas the pension fund lends mainly on the long credit market (the capital market), firms and households contribute to a large extent to the supply of short–term credit (partly via credit institutions). Thus the AP–system can be expected to increase the supply of funds on the capital market. (The quantitative magnitude of this effect depends largely on the incidence of the pension contributions.)

An attempt to analyze empirically the incidence of the pension contributions, after shifting, has been made by Börje Kragh. He finds that the supply of funds to the capital market has risen due to the introduction of the AP–system, whereas the effects on saving are more uncertain [66, ch. 1]. The profit share of national income has fallen by about the full amount of the pension contributions. However, Kragh hesitates to draw the conclusion that firms have been unable to shift the pension contributions onto households. A similar reduction of the profit share has occurred in other countries during the same period, which indicates that some other factors may be responsible for the fall. One explanation might be the above–mentioned fact that domestic rates of inflation in most countries have been much more rapid than the rate of price increase in international markets.

So far, the allocation of the supply of credit does not seem to have changed *drastically* because of the pension fund, as the policy of the

fund has followed about the same principles as those of private pension funds and insurance companies, with the portfolio concentrated on mortgage bonds and securities issued by government and municipalities. Moreover, the effects on the availability of funds of firms has been dampened by the rights of firms to borrow a certain fraction of the fees they have paid to the funds (such loans presently constitute about 6 per cent of the assets of the pension fund). However, a debate has started as to whether the fund, dominated by the government and by representatives from labor market organizations, should not deliberately try to steer the credit market in certain politically determined directions. It has also been discussed whether the resources of the funds should be used to provide risk–bearing capital (for example by shares purchase) to companies, whereby the fund in the future could be a very important center of power in the economy.

The problem has received current interest as a result of the creation of a new public investment bank in 1967. The bank plans to finance most of its lending by issues of bonds, which are expected to be bought by the AP–funds. This means that a public agency might obtain considerable influence over the allocation of long–term, risk–bearing capital. It is still uncertain, however, how much influence political leaders will have on the activities of the bank. It is quite conceivable that the bank will operate rather similarly to private credit institutions, though possibly with greater resources for risk–bearing loans than the institutions that exist now.

## C. *Liberalism or Socialism?*

Swedish economic policy has passed through many different phases since the break–through of deliberate counter–cyclical policy in the early Thirties. The employment issue may be regarded as a "leitmotiv" of policy. There has been a gradual development from the sole reliance on public works, combined with attempts to stimulate private consumption, in the Thirties, to the attempts to control the aggregate volume of private investment in the post–war period—by direct controls in the early post–war period and mainly by incentives later on. The most recent stages of the development have been tendencies to a vigorous labor mobility policy and, finally, selective subsidies to individual firms. The intensification of labor mobility policy started in the 1958/59 recession and was initially intended to fight unemployment, but its emphasis has changed gradually to facilitating *structural* change in the economy by aiding high–income sectors to expand. Consequently, labor mobility (or "adaptability") policy now seems to be as vigorous in booms as in recessions. Helping people to move is no longer confined to the unemployed, but applies also to people who expect to be unemployed or who simply want better jobs. This development of labor market policy in

the post-war period has to a large extent been inspired by trade union economists.

Looking in retrospect at the development of economic policy in Sweden in the post–war period, we may ask if the ambitions in the Labor Movement program from 1944 "to give the economy a new organization and to reshape society in a socialist direction," have been realized. Or has the winner instead been the more "liberalistic" idea in the same program, that the private enterprise system "can in the future be allowed to function in about the same way as before the war," if functioning efficiently?

Obviously, there has in certain respects been a development in a liberal direction; direct controls have been gradually removed, even fewer nationalizations than proposed in the Labor Movement program have been carried out and the ambitions of society to conduct and coordinate investment activity and control foreign trade have been rather limited. Also the attempts to increase the mobility of the factors of production, mainly labor, may be regarded as a way of making the free enterprise market system work more smoothly, rather than trying to overthrow the system. This ambition has, in fact, been explicitly formulated in a program for structural policy presented by the economists of the Confederation of Trade Unions: "Our assumption is, thus, that a development as free as possible—free not only from detailed government controls but also from elements of rigidity inherent in the system—favors the expansive powers and leads to the best economic result." [177, p. 64].

No doubt, ideas of this type have had a strong influence on Swedish economic policy in the post–war period. However, there are also tendencies that may as well be called "socialistic," such as the rapid expansion of the public sector in the service field, the gradual "nationalization of income" through higher tax rates and transfer payments, including the rather elaborate social security system,[63] and the government interventions by monetary, fiscal, labor market and location policies to promote stability and growth. However, the main point to be made on "the ideological issues" is presumably that it is anachronistic to use terms such as "liberalism" and "socialism" to characterize modern economic policy in a "mixed economy" of the Swedish type, with an interventionistic economic policy and a large sector for government services alongside with complete private domination in the field of industry and agriculture. For instance, it does not seem to make much sense to argue whether strong government interventions to remove elements of rigidity constitute liberalism and socialism.

[63] The economic effects of the social security policy in Sweden have not been extensively analyzed. Some of the few expositions on this issue are C. Wellinder [167] and Å. Elmér [27].

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# AUSTRALIAN ECONOMIC POLICY DISCUSSION IN THE POST–WAR PERIOD: A SURVEY

*By* W. M. CORDEN*

This is a survey of what Australian economists have written about economic policy during the post–war period. It describes some of the models which they have constructed and used. The emphasis is on the academic literature rather than on writings in official publications, bank journals and the financial press.

For background the reader is referred to the extensive literature which describes the structure and the development of the Australian economy. The most useful reference by far is the two–volume report of the Committee of Economic Enquiry [4] (known as the Vernon Report) published in 1965, which reviews in detail most aspects of the economy and economic policy and is a vast compendium of information. Many aspects of the economy, its institutions, industries and policy issues are described in P. H. Karmel and M. Brunt [2], in A. Hunter [1] and in R. Mathews [3]. An account of policy during and immediately after the war is in E. R. Walker [5]. Other books of importance will be referred to in the course of the survey.

Australian economists have probably made their most original contributions in writing on wages policy and the arbitration system. So the survey begins with a fairly lengthy account of the discussions in this field. Section II deals with balance of payments issues which, as will be shown at various points in this survey, have tended to dominate Australian economic discussion. Section III concerns tariff policy, section IV banking, monetary and fiscal policy, section V deals briefly with public finance and section VI with immigration and foreign investment. Section VII reviews the extensive Australian literature concerned with economy policy affecting the agricultural sector, section VIII deals with some of the discussion provoked by the recent Vernon Report, and finally the conclusion asks why some fields and not others have been thoroughly explored in the Australian policy literature and how much influence Australian economists exert on policy.

## I. *Wages Policy*

A. *Background*

Australia has developed a centralised system of wage determination as a by–product of attempts to deal with industrial disputes through

compulsory arbitration. While in many other countries the continuing postwar inflation created the need for a wages policy and hence for institutions to operate it, in Australia the institutions came first and a national wages policy became an institutional necessity. This need for a wages policy has naturally been a challenge to Australia's economists and has produced a large and quite sophisticated literature. The system of compulsory arbitration and conciliation is peculiar to Australia and New Zealand and has long attracted the interest of social scientists from other countries (see, for example, B. H. Higgins [17]). Until recently the interest was in its efficiency as a method of settling industrial disputes and avoiding strikes so that an extensive literature describes and discusses the system from that point of view. But here I am concerned primarily with discussions of the effects of the system on the general level and structure of wages and prices.

The institutional background, briefly, is as follows. The Federal Government and the State governments have set up independent tribunals to settle industrial disputes; these make legally binding "awards" and regulate not only wage rates but also working conditions, hours of work, and so on. Disputes must be brought before a tribunal if one of the parties wishes it, and strikes or lock-outs against the decision of a tribunal are subject to penalties, usually financial. The system is not formally centralised but the Federal tribunal, the body now known as the Commonwealth Conciliation and Arbitration Commission (to be referred to hereafter as the "Commission") has acquired leadership among the tribunals. The award wages they determine are minimum, not maximum, rates, which for many workers, especially employees of government and semi-government bodies, become the actual wage rates, although many other employees are able to negotiate "over-award" payments as supplements to award wages. Until 1967 the award wages had two elements, the basic wage and a complicated structure of margins for skill superimposed on it. The basic wage has been much more than a national minimum wage, for an increase in it has been added not only to the wage received by the lowest-paid workers but has raised the general structure of award wages. In 1967 the two elements were combined so that for each type of work the award consists now of a single *total* wage.

Each basic wage case or general margins case before the Commission has generated a vast literature. There are the submissions of the unions and the employers, the evidence presented by economists and others who are called as witnesses by the parties to the "dispute," the lengthy judgments of the members of the Commission—who are all judges and who produce sometimes both a majority and a minority judgment and sometimes more than two—and then the subsequent analyses by econo-

mists and journalists of the judges' reasons for their decisions and the economic consequences of the resulting wage changes. The judgments have often risen little above the level of amateur economics but at times have reflected clear understanding of the fundamental issues and of the evidence presented by academic economists. In recent years the Commission has sometimes radically shifted its position. The literature which I attempt to survey below consists mainly of economists' writings in learned journals and is in a sense peripheral to the main "literature" of submissions and judgments. But it is quite clear that ideas from the learned literature have found their way into submissions before the Commission and have influenced the judges and the parties to the dispute. I shall not attempt the impossible here and identify every point of view with a particular economist, for some economists manage (rather like the judges of the Commission) to sustain a variety of positions at different times or even simultaneously. The principal contributors to the discussion have been J. E. Isaac and K. Hancock, with important contributions from others listed in the bibliography, including visiting economist N. Kaldor. For broad reviews of the issues in Australian wage–fixing with appropriate institutional and historical information, the reader is referred to Isaac [19, 20, 21], Hancock [13, 15], K. Laffer [27] and the Vernon Report [4, Ch. 7].

## B. *A Productivity Geared Wages Policy*

The basic wage was originally conceived of as a national minimum "needs" wage, and from 1921 to 1953 it was automatically adjusted four times a year for changes in a consumer price index. In addition, since 1931 it has been varied at intervals in accordance with a somewhat vague principle, the "capacity to pay" of the Australian economy. Similarly, the general level of the margins for skill has been periodically raised to take into account changes in the cost of living and increases in "capacity to pay." Apart from the cost of living and "capacity to pay," much emphasis has also been placed on the need to settle an industrial dispute in a manner which will appear reasonably equitable to all parties concerned and provide "comparative wage justice."

A central question then is: what is meant by "capacity to pay"? The Commission at one stage suggested that a "prosperous economy" indicated high or increasing "capacity to pay," and thus justified wage increases. Clearly the economy has the capacity to pay any award in money terms that it wants to. The capacity to increase money award wages is limited only if some constraint is established such as the effect on the balance of payments, on income distribution or on the price–level. The need to give content to a vague concept has been a challenge to economists. So some of them sought precise criteria to

guide the Commission in its basic wage and general margins cases. Their answer was identical with that reached more directly in other countries, and was much influenced by Australia's experience of price and wage inflation, particularly up to 1952. (The annual rate of change of average earnings from 1948/49 to 1953/54 was 13 per cent and from 1953/54 to 1965/66 was 4.7 per cent.)

In its simplest form the proposal of these "wage theorists," as they have come to be called, is that money wage and salary earnings should increase in proportion with average productivity (Karmel [25, 26], Hancock [13], M. Cockburn and D. H. Whitehead [6], Vernon Report [4, Ch. 7]). They allow for possible earnings drift (earnings rising faster than award wages), so that award wages may have to increase more slowly than productivity. They assume constant percentage gross profit margins, at least over the longer run, so that prices and the share of wages in non–farm national income would tend to stay constant. Their suggestions have been advocated by the employers before the Commission and have been, more or less, accepted by some of the judges.

Much of the discussion has revolved around five issues: First, what are the nature, extent and cause of the earnings drift and what difficulties does it create for a wages policy that operates only on award wages? Secondly, what determines the shares of wages and profits in non–farm national income, and is it true that these shares cannot be altered by changing award wages? Thirdly, what should be the timing and method of wage adjustments—frequent or only every few years, automatic or discretionary? Fourthly, what complications arise for wages policy in an open economy and particularly in an economy with a very distinct export sector? And finally, and perhaps most importantly, should money wages be adjusted for changes in the cost of living?

The earnings drift, and in particular the question of overaward payments, has provoked a large literature of its own. (See especially, Hancock [16].) A central issue is the relationship between overaward payments and award wages. The evidence suggests that increases in award wages are absorbed by overaward payments only to a small extent, if at all, and in particular that overaward payments may rise but rarely fall. There is much speculation and some evidence, based mostly on rather unsatisfactory statistics, about what determines overaward payments: the candidates for explanation are the level of demand (a Phillips–curve type of relationship), variations in trade union strength, and inappropriate wage relativities (margins) established by the Commission. The difficulty is that the aggregative Australian data reveal only *gross* earnings drift—which depends also on the changing

importance of overtime payments and of payments by results, and on changes in the classification and composition of the work–force. A sample survey (Isaac [22]) suggests that overaward payments in a major industry are about 12 per cent of award wages. It seems from Hancock's and from Isaac's investigations that increases in overaward payments explain only a small part of earnings drift. While some economists, like H. R. Edwards [11], place great stress on overaward payments and regard them as a threat to the whole arbitration system, claiming that in fact the Australian system is a dual system with an arbitration and a collective bargaining element, the more widespread view is that award wages are the dominant determinants of the actual wage level. The question has come up again and again whether earnings drift "uses up" capacity to pay and so lowers the increases in award wages which are compatible with price stability, or whether on the contrary, it justifies, and indeed almost compels, increases in award wages so as to avoid a shift in the distribution of income against that substantial sector of the workforce with weak bargaining power which depends completely on award wages. In fact there is a trade–off between price stability and wage justice for those employees solely on award wages. In addition it is often stressed that award wages must follow actual earnings to some extent so as to avoid awards becoming "unrealistic" and the Australian arbitration system eventually disintegrating.

The wage theorists have considered the division of non–farm income between wages and profits to be fairly constant and not alterable by wages policy. Clearly this is an unsatisfactory line of thought to the trade unions or to others who would like to raise the share of wages in national income. The debate has been vigorous, with much manipulation of aggregative statistics. While it seems clear that the ratio of wages to profits has not always remained constant, Cockburn and Whitehead [6, 7] have shown that changes in the shares bear no consistent relationship to changes in money wages, even when these have been substantial as the result of large increases in the basic wage. The fact that the shares alter for independent reasons (for example, because of the trade cycle or of changing capital intensity) has been held by some (for example A. R. Hall [12]) to show that the Commission cannot determine the price–level, so making the attempt at a wages policy futile. Others hold that something is better than nothing; the price level may rise for independent reasons, but at least wage changes will not have contributed to the increase. The familiar difficulty has been raised that if wages rise in line with average productivity, if there are differential productivity increases, and if prices are inflexible downwards the average level of prices must rise because profit margins in the faster growing industries will be increasing while those in which

productivity grows below the average do not fall. But Whitehead [30] has pointed out that in fact the average profit margin has not been steadily rising even though industries have differed greatly in their productivity increases. Therefore prices in the industries with the faster productivity growth cannot have been inflexible downwards.

One part of the discussion of productivity–geared wages policy has been concerned with the timing and method of wage changes. Should the adjustments in the basic wage be automatic—say two per cent a year—or should they be made only after a Commission hearing? Should the hearings be every three years (as was decided by the Commission in 1961) or every year (as the Commission decided in 1965)? R. I. Downing and Isaac [9] and some others severely criticised the 1961 Commission decision to have a major basic wage hearing and adjustment for productivity changes only every three years. They argued that not only would this procedure lead to sharp discontinuous wage increases at three–year intervals, but it would raise the trend of wage increases, since in the intervening period overaward payments would rise to use up industry's increasing ability to pay higher wages without price increases. On the other hand, H. R. Edwards and Laffer [10] have argued that annual basic wage hearings stimulate expectations of wage increases and create artificially an annual industrial "dispute." Furthermore, the quality of Commission evidence and judgments would improve with less frequent hearings. Kaldor [24] has suggested that there should be full–scale hearings every three years leading to regular annual wage changes to apply until the next hearing. This intensive discussion of the timing problem is an indication of the degree of detail with which Australian economists have discussed wages policy.

## C. Wages Policy and Foreign Trade

An interesting feature of the Australian wages policy discussion has been its concern with the question of how wages should react to changes in prices of exports and imports. The export sector, sometimes identified with the rural sector and dominated in the past by the wool industry, is somewhat distinct from the rest of the economy, with relatively little factor mobility between it and the rest. Thus the discussion has been in terms of a two–sector model, the rural or export sector and the rest. The preoccupation has been with income distribution between these sectors. This is a characteristic feature of Australian economic model–building. Large fluctuations in export prices both pre–war and post–war, and especially during the Korean boom and slump, have been the principal reason for changes in the share of wages in total national income. But to put the importance of the rural sector in perspective, the share of farm income in national income in the years

1957/58 to 1965/66 has averaged only 9 per cent, even though it rose to a peak of 26 per cent in 1950/51.

Three points of view about the proper response of wage policy to changes in export and import prices and the balance of payments can be found well represented in the literature. One is that the general aim should be to maintain a constant income distribution, another that account should be taken primarily of the balance of payments situation and a third, that export prices and the balance of payments should, broadly, be ignored by the Commission. Karmel [25, 26] and E. A. Russell [29] have put forward the first view, namely that real wages should be varied not only with *domestic* productivity but also with *external* productivity, that is, with changes in the terms of trade. If this is done (and given certain assumptions) wages will maintain a constant share of national income and the gains or losses of the rural sector on account of export price fluctuations will be shared with the rest of the community. This burden–sharing idea was first put forward by economists during the depression and led to a 10 per cent reduction in the basic wage in 1931, while a similar gain–sharing idea, advanced by Higgins, played a part in the decision to raise the basic wage by over 13 per cent in 1950. Karmel [25, 26] has shown that if money wages are adjusted with domestic productivity and export prices, real wages will in fact vary with total (domestic plus external) productivity, this being his complete "productivity–gearing" principle for the open economy. (Money wages need not be adjusted to changes in import prices because such changes directly affect real wages through entering the cost of living). This is not a price stability recommendation, since to follow it is to magnify the internal effects of export price fluctuations. The argument is, rather, that improved terms of trade represent increased capacity to pay.

The second approach, leading in practice to a similar type of policy recommendation, is to vary money wages in the light of the balance of payments situation, or at least with domestic productivity modified by balance of payments considerations. It is fairly clear (as Laffer has pointed out [27]) that the Commission's capacity–to–pay concept has always contained a balance of payments element and that at times balance of payments considerations have been dominant. Again, export price rises would lead to wage increases, though wages would also respond, for example, to changes in capital inflow. The third view, which is widely represented, (for example in the Vernon Report [4, Ch. 7]) is that export price fluctuations and balance of payments considerations should generally not affect wages policy, though this principle is usually qualified to allow for substantial and prolonged changes in the terms of trade or the balance of payments. It is argued that it is the job of fiscal

policy to moderate fluctuations in the incomes of the export sector and to ensure that the rest of the economy shares its gains and losses; that increases in export prices are usually followed by decreases while increases in wages can never be reversed, so that there would be a ratchet effect steadily raising wages (as there was in the Korean boom and slump episode); that to adjust wages in line with export prices is to magnify the internal effects of foreign trade fluctuations; that the responsibility for balance of payments equilibrium lies squarely upon the Federal Government, which has a variety of policy instruments available to it; and that, while wages should be adjusted in line with forecasts about productivity and other relevant criteria, the terms of trade, unlike productivity advances, cannot be foreseen. Against these arguments, Russell [29] has pointed out that if money wages are adjusted only for domestic productivity and if export and import prices steadily rise, as they have in the past, the share of wages in the national income will decline, real wages may actually fall, and the balance of payments would go into steady surplus. Clearly over a longer period domestic prices should move roughly in line with foreign trade prices, subject to structural changes which may require some changes in the relationship between domestic and external prices.

## D. *The Cost of Living Adjustment*

The time honoured quarterly automatic adjustment of the basic wage with changes in a cost of living index ended in 1953. It had ensured that the consequences of the Korean boom period and the rise in the real basic wage in 1950 reverberated for years afterwards, even when the economy was in its first post–war slump. The automatic adjustment of the basic wage caused Australian economists to build into their trade and tariff models a constant real wage, an interesting feature of Australian model–building to which I shall refer further below. Since 1953 the Commission in its basic wage judgments has placed varying weight on preceding price changes. Laffer [27] gives a thorough account of its changing attitudes. In its 1961 decision (reversed in 1965) the Commission decided that it would adjust the basic wage each year so as to maintain a constant real value, and then (as mentioned above) review the real basic wage every three years in the light of productivity increases and other factors. An annual hearing would still be held at which the onus of proof would be on the party opposing the automatic cost of living adjustment. This partial return to the pre–1953 practice was welcomed by the unions but opposed by a number of economists, notably Downing and Isaac [9]; essentially they considered that periods of excess demand resulting in increases in overaward payments and higher profits would be followed by basic wage increases, so initiating a

wage–price spiral as in the early 1950s. They stressed that previous price increases are no evidence of "capacity to pay." Against this it has been said that to ignore prices when fixing the basic wage is to destroy the faith of the trade union movement in the arbitration system, to encourage collective bargaining outside it and in fact to endanger its general acceptability. These arguments came to the fore when in its 1965 judgment the majority of the Commission took the advice of Downing and Isaac, abandoned the cost of living as a criterion, returned to annual full–scale hearings, and put the whole emphasis on productivity–gearing and price stability. A compromise, suggested by Kaldor [24], is to adjust the money basic wage in line with productivity, subject to the proviso that it would be raised at least sufficiently to ensure that the real basic wage does not fall; thus the needs principle on which the cost of living adjustment is based would be supplementary to the "capacity to pay" principle. Russell [29], in a sophisticated analysis, has argued that the principle of adjusting for prices and for productivity (domestic and external), as proposed by the Commission in 1961 and generally urged by the trade unions, is almost the same in effect as Karmel's productivity–gearing rule of adjusting for domestic productivity and export prices. He points out that the equivalence is not complete because of adjustment lags in the productivity–plus–prices method. Furthermore, his analysis refers to the adjustment of *earnings* with prices and productivity, and not just of that element of earnings consisting of award wages; so if excess demand leads to a rise in prices, a rise in award wages might not be required by the rule.

### E. *Fundamental Criticisms of Wages Policy*

Radical criticisms of the Australian centralised wage determination system have come from a number of economists—including some (like Isaac [18, 19, 9]) who have also participated in discussions of the details of a wages policy.

The criticisms are of two types. One is that the Australian system fosters more wage inflation than would a system of decentralised collective bargaining because it periodically raises the whole wage structure while collective bargaining would only be able to raise wages piecemeal. Early statements of this view were clearly influenced by Australia's exceptional wage inflation from 1949 to 1952. It can hardly be supported by international comparisons based on years since 1953. A related complaint has been that in the Australian system it has been necessary to raise all wages in order to raise the wages of the lowest–paid workers. It was argued that if the basic wage were genuinely a minimum wage instead of being the plateau upon which all wages rested it would be possible to protect the interests of the weaker and poorer employees

without general wage inflation. The radical proposal that resulted was essentially to break up the system and to revert to collective bargaining underpinned by a minimum wage. This proposal must sound strange to economists in other countries who look to a "national wages policy" as the solution to the cost inflation problem. A less radical proposal was to amalgamate the basic wage and the margin for each category of worker into a *total* wage, thus making it possible to raise the lowest wages without raising the whole wage structure. This proposal was advocated by economists for some time, was more recently taken over by the employers and was finally accepted by the judges in 1967.

A second broad type of criticism is hostile to the whole idea of a wages policy, particularly a productivity–geared one, but not to the arbitration system as such. The view, which certainly has a firm historical basis, is that the primary function of the system is to maintain industrial peace, to "settle disputes," and so to arrive at judgments which will be generally acceptable to the parties. The Commission should not be regarded as an instrument of general economic policy; if it devotes itself to the aims which the "wage theorists" have set for it, it will only lose control of the wage–fixing process. In this view, it is an illusion to think that the Commission can determine actual wages (as distinct from award wages), let alone prices. As the Commission itself has stressed, it is not a national incomes commission. It is only one element, if an important one, in the total wage and price determination process in the Australian economy. Furthermore, why should the whole burden of achieving price stability fall on wage–earners? This view has been put strongly before the Commission by the trade unions and is held by some of the judges; among the academic economists it has been put by Russell [29] and Hall [12]. The strength of this view is that if the Commission listens too much to the economists who argue against the cost of living adjustment and in favour of wage restraint the unions will desert the system for collective bargaining. But it has also obvious weaknesses. The Commission may not take an interest in the broader repercussions of its decisions on the economy, such as the effect on price stability, but nevertheless there will be such repercussions. The Commission's decisions affect not only "the parties to the dispute." Furthermore, wage–earners may lose more through a wages policy that has inflationary effects which then provoke countervailing deflationary monetary and fiscal policies than through a "productivity–geared" wages policy.

## II. *Balance of Payments Issues*

### A. *Background*

Preoccupation with the balance of payments and a "brooding pessi-

mism" about its prospects are characteristics of the Australian economic literature.

For accounts of Australia's post–war balance of payments experience, see the Vernon Report [4] and articles in Arndt and Corden [32]. Until the early 1950's balance of payments difficulties originated from outside Australia and were the main source of internal fluctuations. Thus the depression of the 1930's came to Australia through sharp declines in capital inflow and in export prices. The Korean War induced a great boom in export income which initiated an internal boom; the subsequent balance of payments crisis was the result of the slump in wool prices, a higher wage–level and a high rate of public and private investment, stimulated to some extent by high immigration. But the two most recent balance of payments crises, of 1955/56 and 1960/61, have been the results of internal inflation. The depression crisis led to a 20 per cent devaluation of the Australian pound in relation to the £ sterling, to a 10 per cent cut in the basic wage, to tariff increases, to the imposition of quantitative import restrictions, and to cuts in government expenditure. The 1952 crisis was dealt with by the imposition of wide–ranging quantitative import restrictions which lasted until 1960. The 1955/56 crisis led to a tightening–up of these restrictions as well as some deliberate deflation. Finally, the 1960–61 balance of payments deterioration (which was associated with an internal speculative boom) was tackled with monetary and fiscal deflation. The exchange rate in relation to sterling has not been altered since 1931, though, along with sterling, it was changed in relation to gold in 1949. There was some discussion of appreciation of the exchange rate in 1950, but since then the only possible change discussed has been depreciation.[1] It is of interest to note that during the post–war period imports of goods and services as a percentage of gross national product have ranged from 24 per cent to 15 per cent (leaving aside the quite exceptional year 1951/52), and from 1957/58 to 1965/66 averaged 16.5 per cent.

## B. *Policy Debate*

Quantitative import restrictions were imposed in 1952 as emergency measures, but as the years went by they appeared to be becoming almost permanent. This led to a lively literature analysing their implications and weighing them against the alternative devices of a devaluation of the exchange rate and a uniform *ad valorem* tariff. It was of course generally agreed that, quite apart from these devices, internal

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[1] In November 1967 the Government decided, after some hesitation and internal debate, not to follow sterling and devalue the Australian dollar in relation to gold; thus there was in fact an appreciation relative to sterling.

excess demand must be eliminated by fiscal and monetary policy. Much of this discussion, in which many Australian economists as well as visiting economists Lundberg and Meade participated, is reprinted in H. W. Arndt and W. M. Corden [32] and is also reviewed by Reitsma [53].

T. W. Swan [58] saw the role of import restrictions as a short–run device to avoid excessive price adjustments, and in a particularly original discussion showed how import restrictions can manage to maintain real wages, or at least *apparent* real wages, where other devices would require them to fall. The defenders of import restrictions, for example G. G. Firth and A. J. Hagger [44], felt in particular that import licensing could reduce imports quickly and effectively while they doubted that price elasticities were high enough for price mechanism devices to work. But many economists, particularly E. Lundberg and M. Hill [45] and Corden [38], criticised import restrictions on familiar grounds, that they led to a misallocation of resources, to monopoly profits and to administrative complexities. E. A. Russell [55] and Corden [38] suggested that the import restrictions be replaced by a uniform *ad valorem* tariff, R. L. Mathews [47] and others that there should be a devaluation, while J. E. Meade [48], not unexpectedly, argued for a freely fluctuating exchange rate. A fundamental issue in the discussion, particularly in the 1958 and 1959 literature, was whether the balance of payments difficulties were believed to be long–term; supporters of exchange rate alterations or a uniform tariff argued primarily against import restrictions as a long–term device. It should be stressed that in official thinking, a devaluation or a uniform tariff were not serious alternatives to import restrictions. In particular, it was thought that to tamper with the exchange rate would have endangered the large capital inflow that Australia was receiving.

The present author's proposal [38] was that not only should import restrictions be replaced by a flexible uniform tariff as a balance of payments device, but also that a uniform tariff should (with some exceptions) replace the existing complex system of protective tariffs. This last aspect will be discussed further in the next section. The proposal was a second–best to devaluation, the argument being that a uniform tariff used the price mechanism to select industries for protection and would do automatically the job of quantitative restrictions by reducing most the consumption of those imports which were "inessential," meaning by this that their price elasticities of demand were high. This provoked much controversy (see items [33], [34], [36], [44], [53] in the bibliography). It was argued that a uniform tariff would be contrary to the established tariff–making principles (see below), that it would yield unnecessary profits to those import–competing industries which required a tariff less than the uniform tariff rate to survive, that because of low price elasticities it would be inefficient as a balance of

payments device, that the definition of "inessentials" in terms of the elasticity of demand was inadequate, and that a uniform tariff would be contrary to obligations incurred under international agreements not to increase certain tariffs. Strong practical objections were seen to the idea of imposing the uniform tariff on imported materials.

In weighing import restrictions and tariffs on the one hand against devaluation on the other a crucial consideration was the effect of the different devices on the export sector. The usual argument against devaluation was that it would give an unnecessary bonus to export producers. Since the elasticity of supply of primary products was low this would yield little benefit for the balance of payments. Furthermore, even if extra output did result it could only be sold at lower prices, with little or no rise in the value of exports. In addition the bonus would go to an already wealthy section of the community—the woolgrowers— and could be only at the expense of real wages. But near the end of the 1950's it was clear that the high export prices of the Korean boom period had in fact led to rural investment which bore fruit in greatly increased rural output so that, through a delayed income effect, the supply response did seem to be high. Furthermore, the new synthetic substitutes had probably raised the elasticity of demand for wool. In addition, as wool prices had been steadily declining, the woolgrowers were no longer as wealthy as they had been in the early fifties. Finally, there were exporters other than woolgrowers to consider—other rural exporters whose per capita incomes were not above the Australian average, and exporters of manufactures who, as actual or potential contributors to export income, came more and more into the discussion. It was argued that a devaluation could have a significant effect in increasing exports of manufactures and the choice between import restrictions or tariffs on the one hand and devaluation on the other was much less a question of balance between the rural and the manufacturing sector than a question of the pattern and degree of isolation of the manufacturing sector.

### C. *Balance of Payments Pessimism*

A striking characteristic of the Australian discussions of the 1950's and early sixties has been balance of payments pessimism induced by the fact that for eight years the foreign exchange reserves were maintained with the aid of quantitative import restrictions which had never been intended to be more than temporary, as well as by capital inflow. Furthermore, less than a year after these restrictions were removed in 1960, the government found it necessary to create quite a severe deflation in order to restore balance of payments equilibrium. So the idea of a long–term balance of payments problem," interpreted by econo-

mists as essentially an overvalued exchange rate, came to be widely ac-
cepted. Forecasts of a familiar type were made. The growth in full em-
ployment gross national product was forecast on the basis of assumed
rates of growth of the work–force and productivity. Imports were then
expected to grow roughly in line with this, perhaps with an allowance
for some fall in the import ratio because of import substitution, while
demand and supply of exports were expected to grow much less. In the
early 1950's it was feared that export supply would fail to grow, and
that indeed exports of food might fall absolutely as growth in popula-
tion led to increased domestic food consumption. This anxiety reflected
the characteristic Australian assumption that rural production cannot
be increased significantly. Later in the fifties, as the terms of trade con-
tinued to deteriorate and as the agricultural protectionism of the Euro-
pean Common Market became evident, the fear was that export de-
mand could not be expanded. The forecasts did not allow for the devel-
opments which have in fact maintained a healthy growth in Australian
exports—the emergence of new export products, notably minerals, and
the development of a variety of new markets.

Balance of payments pessimism showed itself in many aspects of
Australian economic discussion. Some argued that import substitution
through industrial development could not really improve the balance of
payments because it induced extra imports of materials and capital
equipment. The major disadvantages of immigration and of capital in-
flow were seen to be their adverse balance of payments effects (see
below). Finally a very original and rather neat "pessimism" model was
produced by Meade and Russell [49]. In this model even the apparent
good fortune of an improvement in the terms of trade worsens the bal-
ance of payments; the model was inspired by the 1951–52 episode
when an initial rise in export prices seemed to lead to a rise in the basic
wage and then to a balance of payments deterioration. It is a simple
model, with a land–intensive exportable and a labor–intensive im-
portable sector, in which an exogenous improvement in the terms of
trade requires for the maintenance of internal and external balance a
rise in real rents and a fall in real wages (unless tariffs are increased).
Meade and Russell then built into the model a constant real wage, thus
taking into account the cost–of–living adjustment of the basic wage.
They showed that with rigid real wages and no change in tariffs or im-
port restrictions, either full employment or the balance of payments
must give way. Though J. D. Pitchford [51] has pointed out that in-
troducing a third sector producing non–traded goods alters the sim-
plicity of the conclusions, it is nevertheless a model which sheds some
light on the mechanisms operating in the Australian economy in the
early 1950's.

Balance of payments forecasting became a matter for vigorous debate when the Vernon Committee [4, Ch. 15, App. N], produced a pessimistic forecast for the mid 1970's, based mainly on pessimism about rural export prospects and rising dividend payments on foreign capital. Though the Committee was very cautious, suggesting that it was making a projection rather than a forecast, it nevertheless drew policy conclusions from its results. A Treasury Paper [60] countered with some piecemeal forecasts which implied that balance of payments prospects may be much better than suggested by the Vernon Committee, but more important, argued that long–term forecasts could not in fact be made with any success and that it was in any case not necessary to make them. Surprisingly, the Treasury seemed to argue that few policy decisions with long–term implications need be made. Perkins [50] actually criticised the Vernon forecasts as too optimistic but, in rebuttal of Treasury and similar views, put up a strong case for quantitative forecasting as such. There is no doubt that the Treasury reaction, as well as the reaction of some economists, such as H. F. Lydall [46], were really reactions against what seemed to have become a traditional pessimism, a pessimism which appeared untimely in 1965 when a mineral export boom seemed to be in prospect.

## D. *Policy Models*

The interrelations between balance of payments policy, wages policy and expenditure policy were set out by Swan in a paper written and circulated in 1953, though only published in 1960 [57]. In this elegant, indeed brilliant, paper he spelled out in an Australian context and a Tinbergen–theoretical framework the relationships between three targets—external balance, full employment and price stability—and three instruments—the volume of demand, the money wage level and what he calls the external price level (namely the foreign price level in terms of domestic currency), the latter two instruments being operated through the Arbitration Commission and the exchange rate respectively. He showed how the real wage is determined by the model, and discussed the problem of assigning particular targets to particular instruments. This paper was, to some extent, a contribution to the debate about wages policy, and especially to the discussion about the cost of living adjustment of the basic wage. Swan's model differed from the macro–economic models constructed elsewhere, and especially by Meade, in an important respect. He assumed that as Australia is a small country in the world economy the terms of trade are given to it; it is thus what he calls a "dependent economy." This means that exchange rate adjustment is not associated with a terms of trade change, but rather the exchange rate affects the relationship between export and

import prices on the one hand (what he calls the external price level) and domestic labor costs (the money wage level) on the other. Put another way, it affects the ratio between traded goods and non–traded goods prices. The explicit introduction of non–traded goods is indeed a crucial element in the model.

In another paper, circulated in 1955 though only published in 1963 [58], Swan presented a diagram which has been widely used in teaching in Australia and which illustrates the relationship between the two targets of internal and external balance and the two instruments of real expenditure adjustment and cost ratio adjustment. Again, constant terms of trade are assumed, the cost ratio being an internal price relationship which can be altered by wages policy or exchange rate adjustment. This diagram inspired a number of other theoretical contributions along similar lines. In W. E. G. Salter's [56] diagrammatic analysis of the relationship between the targets of internal and external balance and the instruments of price and of expenditure adjustment the distinction between traded and non–traded goods is more explicit than in Swan's diagram. Salter's diagram, with its transformation curve and indifference curve, marries the Swan analysis to familiar international trade geometry. Corden [39] developed a similar diagrammatic analysis, making the characteristically Australian assumption that the elasticity of supply of exports is zero; this simplification made it possible to introduce several refinements and illustrate a variety of balance of payments devices. Perhaps the most significant conclusion to come out of these diagrams is that a description of the particular disequilibrium condition in which the economy finds itself is not sufficient to indicate the direction in which the two policy instruments should be moved— Swan's four "zones of economic unhappiness" do not coincide with his four policy quadrants. Finally, A. M. C. Waterman [59] has recently developed the Swan diagram further by introducing a Phillips curve relationship between the level of employment and the rate of change of money wages.

### III. *Tariff Policy*

#### A. *Background*

The Australian literature on tariff protection is quite extensive and contains some original contributions to economic thought. One reason for this is simply the importance to Australia of its tariffs. Australia is a highly industrialised nation with about 27 per cent of the workforce engaged in manufacturing and a substantial part of manufacturing, probably employing about 60 per cent of the manufacturing workforce, depending for its survival on protective tariffs. Many of these tariffs are high and the average may be about 30 per cent. The use of wide-

spread tariff protection to foster industrial development is not a political issue in Australia for there is no significant opposition to protection as such. The discussions about "protection versus free trade" to which I shall refer below are essentially academic and are concerned with seeking a rationale for well established policies. The only issue is the height and pattern of tariffs. As the Australian stage of development is just one step ahead of many less developed countries which are embarking on industrialisation, the Australian discussion of the details of tariff–making and of the process of import substitution should be of some interest to these countries.

Australian post–war discussions of tariff policy and of the logic of protection have taken place in the shadow of a famous official report by a group of economists published in 1929, known as the Brigden report [35], one of the best–known and most original works of economics ever to have been produced in Australia. It made two significant contributions. The first was a novel argument for protection appropriate to Australian conditions, that protection made it possible for Australia to maintain a larger population than could have been maintained under free trade at the existing standard of living. As reviewers have shown, this was really an income distribution argument; for a given population, protection raises real wages at the expense of rents, and since the supply of immigrants depends on the level of real wages thus makes possible an increased population. The argument also had other aspects: the elasticities of supply and demand for exports were regarded as low, so that extra population would have to be employed mainly in import–replacing manufacturing industry, which in turn required tariff protection. The general argument that the tariff is required if a growing population is to be employed without falling real wages is a widely accepted argument for protection in Australia today. Secondly, the Brigden report contained an analysis of the "excess costs" of protection. The method of calculation was to determine the volume of protected output and then to estimate the excess of the domestic value of output over what equivalent imports would have cost, the volume of protected output being calculated at a constant exchange rate and on the assumption that if tariffs were removed money wages would be so varied as to keep real wages constant. One recognises here again the impact on Australian economic model–building of the cost–of–living adjustment of the basic wage. The report contained an original analysis of the repercussions of the tariff; it showed how the imposition of tariffs raises money wages, how it raises input costs of other industries, how "sheltered" industries (producing non–traded goods or products sheltered by protection) raise their prices in consequence, and finally how the whole burden of the tariff is borne by those industries which

cannot raise their prices, namely the "unsheltered" or export industries.

The Brigden report yielded many reviews and a large literature designed to clarify it and develop its arguments. The income distribution argument for protection has been further refined in the United States and the refined theories have in turn been used to reconsider the Brigden arguments. For a thorough survey of the literature of the income distribution argument for protection, beginning with an article by Brigden which preceded the report, and taking into account the subsequent literature outside Australia, see A. J. Reitsma [52], and for a technical analysis of the Brigden model and its method of calculating the cost of protection, see Corden [37].

## B. *Arguments for Protection and the Cost of Protection*

The post–war literature on the logic of Australian protectionism and the cost of protection may be summarised as "from Brigden to Vernon." The new approach has been to stress that the free trade alternative to protection requires a devaluation of the exchange rate and that the present situation of protection must be compared with one where there are no tariffs and where the exchange rate is devalued sufficiently to maintain internal and external balance. This was expounded particularly clearly in the Vernon Report [4, Ch. 13], and earlier in [40]. One can then argue for protection on the ground that the exchange rate is institutionally or politically constrained—so that it is correct to say that tariffs are required to maintain full or growing employment. Alternatively, one can specify the reasons why devaluation may be undesirable—that it would create uncertainty about the exchange rate and so inhibit capital inflow, that it would give an unnecessary bonus to exporters yielding little benefit in extra foreign exchange proceeds from exports, and that it would lower real wages or, if the attempt were made to maintain real wages, that it would cause a wage–price spiral and thus continuing disequilibrium. It will be recognised that these are issues that entered into the balance of payments discussions. All these arguments against devaluation appeared in the Vernon Report which, in a somewhat unrigorous discussion, appeared to come to the conclusion that probably the tariff had been beneficial to Australia, though one could not really be sure about its effects. This report, like the Brigden report, stressed the (alleged) inelasticity of the supply of rural exports, and so argued that development would have to be import–replacing, an approach that can be criticised (as it has been in [42]) for its neglect of the possibilities of expanding exports of manufactures.

Brigden's cost of protection concept has also received renewed attention. The present author [37] analysed the concept with Marshallian

and general equilibrium methods, distinguishing between the production and the consumption cost of protection and pointing out in which respects the Brigden method overstated or understated the "true" cost of protection. Reitsma [54] has reviewed the literature on this subject, including recent North American contributions. The Vernon committee [4, App. L. (iv)] made a new calculation of the cost of protection, defined essentially in the Brigden sense, for the year 1961–62, provided a careful analysis of its limited meaning and gave it a new name, the "subsidy equivalent" of the tariff, which brings out the fact that it is the subsidy which the Treasury would have to pay out if protection equivalent to that provided by the existing tariff system were to be provided instead by direct subsidy.

## C. *The Structure of a Tariff System*

Australian economists have long discussed the logic of protectionism and why tariffs may be preferable to free trade, but until recently have offered very little guidance on what the structure of a tariff system should be, given that a general argument for protection is accepted. In fact, the problem is not to recommend an optimum structure, as if tariffs were imposed *de novo*, but rather to provide guidance for particular tariff decisions when most existing tariffs cannot be altered.

Changes in the Australian tariff are made by the Federal government (through Parliament) after receiving recommendations from the Tariff Board, a semi–independent body which is of considerable importance in the Australian economic scene. Over the years the Board has developed methods and principles which it might sum up by saying that it will only recommend tariffs for industries which are "economic and efficient," that it will avoid tariffs that do not succeed in protecting and, where it does consider protection appropriate, that it will give sufficient protection to yield the domestic industry the greater part of the domestic market and a reasonable profit margin. All this is rather vague and allows plenty of latitude for political pressures and various other considerations. It is arguable [41] that one can detect another criterion, namely that in general all industries that exist will be protected, and that implicit in the intricate Australian methods of tariff–making is the "made–to–measure" principle, namely the principle that new tariff rates will be measured precisely for each product so that no more than necessary is provided, the aim being to avoid undue producers' surplus and monopoly profits. This principle determines how much protection will be provided once protection has been decided upon and is simple in theory but complex in application; it explains the elaborate calculations and investigations which the Tariff Board carries out and the complicated and finely differentiated tariffs which it sometimes rec-

ommends, but it provides no guidance as to which products should be protected.

The uniform tariff proposal [38], already referred to, was a proposal for cutting through the jungle with the price mechanism. Perhaps the most fundamental criticism of this proposal, stated first explicitly by B. Cameron [36], was that it was contrary to the made–to–measure principle, for it would yield undue profits to industries which needed less than the uniform tariff. Cameron and similar critics would introduce cost considerations into the choice of which industries to protect by fixing a maximum tariff rate. This idea of a maximum, at least for new tariffs, was supported by a minority of the Tariff Board in the Board's 1966 annual report [61].

The idea of the uniform tariff, and also of devaluation as an alternative to protection, underlay the main tariff proposal of the Vernon Report [4, Chs. 13, 14]. The committee suggested that import-competing industry was subject to a "general cost disability" essentially because the exchange rate was overvalued, and that this general disability was, in some sense, the average of existing tariff rates. It should be regarded as a "benchmark" in relation to which the Tariff Board could assess particular tariffs, especially new tariffs. Tariffs up to the general disability rate would be given quite readily while tariffs above it would be awarded only reluctantly or where there were special considerations. On the basis of calculations of the average tariff it suggested that the general disability might be of the order of 30 per cent. It felt that this concept, while it should not be rigidly applied, would give some meaning to the idea that only "economic" industries should be protected. Although the concept was explained at length in the report, the discussion contained some confusions which led to various misunderstandings. Nevertheless it has made an impact, and in a modified form may affect actual tariff policies. It was not a proposal for a uniform tariff, although this concept underlay it, for the committee explicitly argued in favour of made–to–measure principles of tariff–making, and in particular that there should not be tariffs on imported inputs not produced in Australia. A criticism, made for example by a majority of Tariff Board members in their 1966 annual report [61], has been that the general disability rate could not be calculated with any accuracy, and in the absence of a precise figure could not in practice be used. The majority preferred to have a separate standard tariff rate for each industry, their proposal at least implying some movement towards tariff simplification. The present author [43] has analysed the relationships between the two calculations of the average tariff made by the committee (the first used as weights the value of imports of protected items, and the second the value of protected domestic output) and the "gen-

eral cost disability" defined either as the uniform tariff equivalent or as the devaluation equivalent of the existing tariff structure.

The Vernon committee [4, Ch. 14, App. L (iv)] also made use of the new concept of the "effective protective rate" (protection in relation to value added). It stressed the need for the Tariff Board to take effective rates into account when making policy recommendations, and made calculations of effective rates for some protected Australian products, being something of a world pioneer in this field. While it presented a detailed analysis relating the effective protective rate concept to the "subsidy equivalent" it failed to relate it to its other new concept, the "general cost disability," a relationship subsequently explained in [42]. It is already evident from Tariff Board reports that the effective rate concept has made a considerable impact on the Board's thinking.

## IV. *Banking, Monetary and Fiscal Policy*

The literature in this field is large and the public controversy has been vigorous and often heated. While academic economists have contributed description, analysis and policy recommendations, and have argued with non–economists, including spokesmen of pressure groups, they have not contributed much novel analysis nor have they engaged in significant controversy among themselves. Since, in addition, the problems Australia has faced have on the whole been similar to those of other advanced countries, I shall dispose of this subject more briefly than its prominence in Australia might warrant.

A complete review of monetary policy post–war and of the issues and debates surrounding it can be found in the various editions of Arndt's standard work [64], the history of the central bank up to 1945 in L. F. Giblin [78], a detailed analysis of post–war fiscal policies in M. I. Artis and R. H. Wallace [68], an account of the monetary problems of the period 1948 to 1952 in D. C. Rowan [95], and a thorough description and discussion of monetary and fiscal policies from 1960 to 1964 in Perkins [90]. Three frank and perceptive articles by the Governor and the Deputy Governor of the central bank review between them all the main issues of monetary policy from 1945 to 1964 [71, 72, 92]. There is a literature, both descriptive and policy–oriented, on the capital market, describing recent changes and concerned in particular with the adequacy of the institutions. On this subject, which will not be discussed below, see R. R. Hirst and R. H. Wallace [83] and the writings of R. F. Henderson [80, 82]. Finally, the reader should note the surveys of the Australian economy which have regularly appeared in *The Economic Record* since 1956 and which generally review the short–term management of the economy. These surveys have filled the gap left by the absence until recently of an inde-

pendent research institute like the National Institute of Economic and Social Research in London, and they represent the main contribution of academic economists to short–term economic policy debate in Australia. The discussions of fiscal policy in these surveys have been criticised severely by Artis and Wallace [68] and their forecasts have been reviewed in detail by D. J. Smyth [98] who has found them to have been not particularly accurate and yet quite good by international standards, and has criticised them for not having been based on an explicit econometric model.

## A. *The Conflict with the Private Banks*

One subject which has been very prominent in Australian discussion has been the prolonged conflict in the post–war years between the private banks on the one hand and the government and central bank on the other. This has been a special feature of the Australian situation.

Australia has eight large trading banks, all engaging in branch banking, two owned and controlled in Britain and one government–owned. The central bank, now called the Reserve Bank of Australia, was originally established as a government trading and savings bank to "break the monopoly" of the private banks and only gradually acquired the powers of a central bank. It assumed some central banking functions during the depression but, lacking adequate powers of control, depended on the co–operation of the private banks. It was given complete central banking powers, including control over foreign exchange and over the commercial banks' liquidity, by emergency war legislation in 1939. These powers were embodied in peacetime legislation which was put through by the Labor government in 1945 against fierce opposition from the private banks.

Until 1939 monetary policy was to a considerable extent under the control of the private banks and they have been reluctant to give up their powers. Suspicion of private banking has been endemic in the Australian Labor movement. Perhaps as a result, the private banks saw every measure of central banking control which the Labor government of 1942–1949 sought to impose on them as a move towards nationalisation. In 1947 the government sought indeed to nationalise the private banks but was stopped by a constitutional interpretation which has seemed to make the nationalisation of any industry that trades in more than one State unconstitutional. The private banks' suspicion of the central bank and their reluctance to co–operate with its monetary policy did not cease with the election of the Liberal–Country Party government in 1949 but was gradually allayed by the diplomacy of the central bank and by a series of concessions by this government in amendments to the Labor banking legislation.

The Labor government attempted to nationalise the banks because it believed that they were not prepared to co–operate with the central bank in making the 1945 legislation effective and in particular that they intended to challenge the constitutional validity of key elements of the legislation in the courts. It was haunted by the fear of a depression and wanted to ensure that it was armed with full monetary controls [99]. Opponents argued convincingly that nationalisation would deprive the public of choice of bankers (this argument was probably crucial in swinging public opinion and leading to the government's defeat in 1949), unconvincingly that of course the private banks had always intended to co–operate with the central bank and allow it to determine monetary policy, and rather hysterically through expensive advertising campaigns that nationalisation of banking would spell the end of liberty in Australia. The story has been told by M. G. Myers [89]. It has been an important episode in Australian political history but did not lead to significant debate at an academic level.

The efforts of the central bank to influence the credit policies of the trading banks represent a long tale of difficulties on which economists such as Arndt [64] and Perkins [90], as well as the Governor of the central bank himself [71, 72], have provided commentaries. Partly the problem was just a spirit of non–co–operation. But there were two other problems. One arose from the operation of the overdraft system of bank lending. This meant that a large volume of unused limits (lines of credit) was at the disposal of the public at any time, so that it was difficult for the banks themselves to control the volume of bank credit actually used. The almost universal use of the overdraft method and the predominance of bank credit made this a more serious obstacle to monetary control in Australia than in other countries (see Arndt's detailed analysis [67]). A second and more important problem was that the banks' liquidity ratios tended to vary cyclically and to differ sharply from bank to bank. The latter fact meant that a restrictive policy which was applied non–discriminatorily as between the banks would have little effect on one bank but create a crisis for another.

Various devices to control credit were used by the central bank. Great difficulty was encountered in the boom of 1960; it has been argued by R. W. Davis and R. H. Wallace [75] that a major cause of the difficulties at this time was the varying behaviour among the banks, though Arndt [64] gives less weight to this explanation. The central bank has used a variant of variable minimum reserve requirements which was initially quite unique, namely the method of Special Accounts. This method, which encountered many difficulties, is too complex to be described in detail (see Arndt [63]). Essentially it meant that the central bank could immobilize in frozen accounts with itself part of the trading banks' funds. From 1953 to 1959 it could "call to

special account" at any time not only existing special account balances, but also any amount that could have been called previously but was not actually called, as well as three quarters of the increase in trading deposits during the preceding year. In its original form it led to the accumulation by the central bank of uncalled liabilities in which the private banks professed to see a threat to their existence; the banks also increasingly came to treat their Special Accounts as a second line of reserves of liquid assets, knowing that the central bank would bail them out of a liquidity crisis. The system has been gradually changed through the establishment of a conventional liquidity ratio supported by consultation, requests and directives, while the role played in the system by Special Accounts (renamed Statutory Reserve Deposits) has somewhat declined. Thus the Australian system of liquidity control is now much the same as in other countries.

Although originally founded by a Labor government as a government trading bank, the Commonwealth Bank under conservative governments from 1924 on was instructed not to compete actively with the private banks. In the Labor government's 1945 legislation it was again enjoined, over the vigorous protests of the private banks, to develop its trading banking activities and actively to compete. The trading section of the central bank became very successful and its successor is now the second largest trading bank in Australia. The debate revolved around the question whether state commercial banking should be separated from central banking. The argument in favour of commercial operations by the central bank was that its commercial activities were helpful to its central banking activities both because it meant that there was a significant section of commercial banking (as well as a big savings bank) over which the central bank could exercise adequate monetary control and because these branches of the central bank were a useful source of information on the state of business in different sectors of the economy. But to have a central bank competing with private banks was certainly contrary to central banking practices in other countries. The private banks claimed that the competition from the central bank was "unfair"; more importantly, the practice made a good working relationship between the private banks and the central bank almost impossible. The opposition to the practice prevailed, and in 1959 the government trading and savings bank activities were completely separated from the central bank; the new government banks continue as active and successful competitors with the private banks.

## B. *Monetary Policy*

Aside from the question of control over the private banks, the Australian problems and discussions of monetary policy post–war are similar to those of other advanced countries. Australia has seen the devel-

opment in the last few years of open market operations and of a short–term money market. Reluctantly Australia has moved away from a low interest policy, rather later than Britain. This movement was induced particularly by the development of non–bank financial intermediaries which made control of bank liquidity—even if that could be achieved—quite inadequate as the main instrument of monetary policy. The development of the new financial institutions is a phenomenon not confined to Australia and so needs little comment. But it was particularly important in Australia as the credit scene had until a few years ago been dominated by a limited number of trading and savings banks, and as the trading banks were conservative in the type of business they were prepared to finance. There has been considerable academic discussion of non-bank financial intermediaries and of "Radcliffe" monetary theory [62, 66, 84, 88, 96, 97]. The Commonwealth Constitution makes direct monetary control of non–bank intermediaries by the central bank or the government difficult if not impossible in Australia. This has been an important impetus towards a flexible interest rate policy, although the Deputy Governor of the Central bank has indicated [92] that in any case the bank would find it difficult to control the liquidity of so many financial institutions, while Perkins [90] has stressed doubts about the efficiency of direct control measures.

The ideology of "cheap money" has long had deep roots in Australia. Resistance to higher interest rates therefore was widespread and popular; in particular it came from the political Left but it was also supported by State governments of all parties. The case for higher interest rates was pressed in public only by the trading banks and by professional economists. Economists have strongly advocated a flexible interest policy. Their usual criticisms have been that interest rates have been raised insufficiently, or not at all; thus in 1956 a group of leading academic economists issued a manifesto advocating higher taxes and higher interest rates to cope with the current inflationary situation [85]. But in 1962, quite consistently, Perkins [91] severely criticised the failure to reduce interest rates sufficiently in the recession of 1961–62.

## C. *Fiscal Policy*

Full employment has been the overriding aim of Australian economic policy post–war, supported by all political parties. The dedication to full employment is explained by Australia's severe experience in the depression of the 1930's; on the other hand, it has never suffered from really drastic inflation. At all international conferences from 1943 to 1945 concerned with the establishment of new international organisations the Australian delegation sought to have written into the agree-

ments a pledge by all signatories to sustain policies of full employment, and Australia was instrumental in getting a full employment pledge written into the United Nations charter [74]. In Australia, unlike the United States, there has never been popular or political resistance to budget deficits. No doubt this explains, among other things, why unemployment has never in the post–war period risen above 3 per cent of the workforce and has usually been nearer 1 per cent.

The opposition has been rather to increasing taxation and especially to raising taxes in order to achieve a budget surplus. A budget surplus usually provokes pressure through the newspapers to reduce taxes. The opposition to tax increases in inflationary situations has been based partly on pure ignorance and partly on right–wing ideology. The argument—developed in Australia most sophisticatedly by C. Clark [70]—has been that higher taxes mean inevitably higher government expenditures, that they reduce savings and incentives, and hence efficiency and productivity, and thus are inflationary, and finally that the simple remedy for inflation is to reduce government expenditures. But the academic economists have generally been staunch advocates of a flexible fiscal policy and of the need to raise the ratio of public to private expenditures for Galbraithian reasons [76]. The issue was highlighted in 1960 when the Institute of Public Affairs, a business–financed research organisation which publishes a journal of economic commentary, strongly opposed tax increases at a time when a boom was obviously developing. The views advanced by this organisation, which have been quite widely held, have been analysed in detail by Arndt [65]. Undoubtedly the opposition coming from business quarters has limited the use of a flexible fiscal policy. This issue also arose during the Korean boom in 1950 when a proposal from D. B. Copland [73] for a stabilisation tax on wool exports was strongly resisted.

In reviewing the whole post–war period, Artis and Wallace [68] have suggested that the Treasurers' budget speeches have not consistently reflected an understanding or acceptance of functional finance. But it is probable that the difficulties have rather been with policy lags, with popular opposition to raising tax rates and with Treasurers' fears that tax rates that are once reduced cannot, for political reasons, be readily raised again later. Progress towards fiscal flexibility has in fact been considerable. In 1961–62 tax rates were altered three times in one fiscal year. A new fiscal device has been adopted, a uniform rebate or surcharge on all personal income tax payable. A 5 per cent rebate was first granted in 1959; it has been varied several times since then, removed twice, and in 1965 became a 2½ per cent surcharge.

The debate on monetary and fiscal policies, as indeed on economic growth and on economic management generally, was greatly stimulated

by the 1960–61 episode of boom and balance of payments crisis, followed by slump. It has been the general view of economists that government and central banking policy did not do enough to restrain the boom in the course of 1960 and that tax increases, higher interest rates and greater restriction of credit were required. Opinions have differed somewhat as to whether the measures of fiscal and monetary deflation and the deliberate psychological shock administered in November 1960 were necessary or too drastic; but there has been fairly general agreement that the government was too slow and inflexible in meeting the need to reflate in 1961—a slowness which nearly cost the government the 1961 elections. The literature on this two–year period is extensive and has focussed particularly on the substantial policy and reaction lags in the Australian economy; see especially H. F. Lydall [86], A. R. Hall [79], Henderson [80], Perkins [90], and Davis and Wallace [75].

## V. *Public Finance*

In 1964 a group of economists produced a comprehensive report on the Australian taxation system [76]. Using equity as the main criterion, the group proposed a number of reforms, none of which has been adopted by Australia's conservative Federal government. Some of the proposals, such as that for an increase in tax progression in the higher income ranges, and an increase in the petrol tax, are important in the Australian context but not novel in any sense. But a rather novel system of company taxation was suggested. All company profits should either be distributed or pay the maximum marginal rate of personal income tax. Companies could plough back part of their profits by distributing them as bonus shares, the recipients being taxed as if these shares were actual dividends. The group recommended this scheme, supplemented by a modest net worth tax, as a preferable alternative to a capital gains tax. Lydall [87] has examined these and other proposals carefully. This taxation report has been a valuable contribution as the only study of its type in Australia, even though it can be criticised as overemphasizing "equity" as the main criterion of a good tax system.

The financial arrangements in Australia's federal system have always been of interest outside Australia. Before the war two interesting institutions were developed, one being the Loan Council, which coordinated borrowing by the Federal government and the six States, and the other the Grants Commission, which recommended "special grants" to be paid by the Federal government to certain States in a weak financial position. A theory of special grants was developed in the annual reports of the commission. The principle advanced initially by the claimant states that they should be compensated for the "disabilities" which

they had suffered from federation, and in particular from the tariff, was rejected. Instead the commission developed the principle that it was the purpose of special grants to enable claimant states to function at a standard "not appreciably below" that of other states. The methods and criteria of the Grants Commission are of interest, and have been much written about, notably post–war by W. Prest [93, 94]. But the Grants Commission has in fact become much less important because of the uniform income taxation system which has operated since 1942.

The position now is that all income taxes, personal and company, as well as the major indirect taxes, are collected by the Federal government while important economic functions, such as education, health, and the conduct of most public utilities, remain with the States. These receive more than half of their revenues (other than borrowing) in the form of grants from the Federal government, grants which are allocated among the States on a needs, and not a collection basis and which are mainly untied. The federal system has been transformed by this financial dependence of the States on the Federal government. Furthermore, the Federal government in practice also controls the amounts the States can borrow.

There has been some discussion about the implications of this situation. A major problem is that funds for essential activities, notably education, are inadequate because the revenue–raising authority is divorced from direct responsibility for the activity. It has also been argued that the system leads to financial irresponsibility by the States. There are continuous disputes about the methods of allocating the grants. Various reform proposals have been advanced, notably that income tax revert to the States, that the States institute a marginal income tax, and that the States develop new forms of taxation, such as business taxes. The financial situation in the Australian federation differs from that of most other federations because of the importance of untied grants from the Federal government to the States, so that the Australian literature, while mainly descriptive, is of considerable interest. Aside from the annual reports of the Grants Commission, the most useful post–war economic discussions are by Giblin [77], H. P. Brown [69], and Prest [93, 94].

## VI. *Immigration and Foreign Investment*

### A. *Immigration*

Immigration has been very important in Australia's post–war economic development. From 1947 to 1966 total population growth averaged 2.2 per cent a year, of which 0.9 per cent was due to immigration and 1.3 per cent to natural increase. Immigrants and their offspring have accounted for about half the population increase over the period.

This has led to a large and valuable demographic literature, describing and analysing the trends and emphasizing in particular the effects of migration on the age distribution of the population. The main economic factor stressed in the demographic discussions has been that because of the low birth–rates of the 1930's the Australian–born workforce hardly increased in the 1950's, so that immigration filled an important gap in the population and made possible an increase in the workforce. The principal contributor in this field has been W. D. Borrie ([105], [106] in the bibliography being just two examples of his writings).

But immigration has not provoked a large economic literature. Possibly the effects of immigration, though most important, have been so diffused through the economy that it has hardly been possible to study them in isolation from other major economic variables. A more plausible reason is that the motives for encouraging large–scale immigration have been largely non–economic and not disputed. In view of the wide consensus on the subject, discussions about the economic gains and losses would have been of little practical significance.

The rate of immigration was at its peak in the years from 1949 to 1952, a period which coincided with rapid inflation followed in 1952 by a balance of payments crisis. The causes of the inflation and the balance of payments difficulties were of course various, but one factor, at least, was a high rate of public investment stimulated by immigration. Inevitably, the emphasis on the discussions at this time was on the inflationary effects of immigration. At this early stage the discussion was usually in terms of capital–output ratios, using Clark's estimates, and making simple assumptions, such as the assumption that the ratio of capital to labour and to output needs to be kept constant by adequate investment. Most of these and other issues concerned both with the motives and the economic aspects of immigration have been reviewed briefly by Arndt [103].

D. M. Bensusan-Butt [104] produced the first rigorous discussion of immigration economics. His particular emphasis, which anticipated later growth theory literature outside Australia, was the effect that population growth has on the pattern of output within the capital–goods sector through the shift from intensive to extensive investment, and so on the relative prices of different capital–goods, as well as on the prices of capital–goods in general relative to consumption–goods. The major discussion of the economic effects of immigration has been P. H. Karmel's [112]. He stressed both the inflationary effects and, as the essential limit to immigration, the adverse short–term effects on the balance of payments. He assumed that the supply of exportables would not increase in the short–run but that population growth re-

duced exports through increased domestic consumption of export-
ables and that the demand for importables, both capital and
consumption–goods, would increase more than the supply. One recog-
nises here the familiar Australian model and the characteristic balance
of payments pessimism. Corden [108] supplemented this with a more
theoretical analysis of the economic limits to immigration, putting, like
Karmel, the emphasis on the balance of payments effects, introducing
the exchange rate and the tariff as possible variables, and making an
early use of the growth–and–trade theories which were then develop-
ing. Apart from these theoretical discussions at a macro–level, empiri-
cal contributions by R. T. Appleyard [100, 101] have been concerned
with explaining particular migration movements, namely the reasons
for some migrants returning to their home countries, and the effects of
unemployment on migration.

### B. *Foreign Investment: Background*

About 10 per cent of Australian capital formation since 1949 has
been financed overseas, almost wholly in Britain and the United States.
An increasing proportion has come from North America; by 1964/65
it was 43 per cent of the year's private capital inflow (including rein-
vested profits). Most of the foreign investment has been direct invest-
ment in manufacturing industry. This contrasts with capital inflow in
the 1920's and earlier which consisted mainly of borrowing at fixed in-
terest on the London capital market by the Federal and State govern-
ments and by semi–government authorities. About one–third of the
capital in Australian manufacturing companies may now be directly
owned overseas.

The Federal government has actively encouraged this inflow, has
prided itself on its success in obtaining new capital, and has encouraged
it as a keystone of Australian development and a natural concomitant
of large–scale immigration. It has argued that Australia cannot be ex-
pected to meet its own capital requirements, mainly because of high im-
migration. It has not discriminated against foreign capital in any way
and has placed no restrictions on profit remittances. The State govern-
ments have competed to attract new enterprises by providing a variety
of concession and facilities. While this sympathetic attitude is broadly
in tune with public opinion, the financial and popular press and the
speeches of businessmen and politicians have reflected plenty of doubts
—that the profits of foreign capital are excessive and ought to be
shared with local capital by giving local investors an equity in overseas
controlled companies, that profit remittances create a balance of pay-
ments problem, or at least the prospect of one, and that Australia is los-
ing control of her industry and resources. The first two objections were
stimulated by the very high profits being made in the 1950's by the

subsidiary of General Motors, the principal United States investment in Australia. The last objection has become prominent more recently as foreign capital has entered to exploit new mineral discoveries.

### C. *Foreign Investment: The Literature*

The effects of profit remittances on the balance of payments have generally been regarded in the Australian economic literature as the main disadvantage of foreign investment, the advantages consisting of external economies of various kinds. This attitude reflects again the Australian balance of payments pessimism. It was inspired by the balance of payments difficulties of the 1950's and by the General Motors remittances.

The first serious academic contribution on the effects of foreign investment in Australia was by Arndt [102]. He argued that foreign investment would have to go into export and import-replacing industries to avoid balance of payments difficulties. He also suggested that the actual bias of foreign investment towards import substitution rather than exporting presented a problem for the balance of payments, implying that for a number of reasons so-called import substitution would not actually succeed in reducing imports. Perkins [116], in an article which sorted out many of the issues surrounding foreign investment and disposed of various popular fallacies, argued that it is sufficient for foreign capital to go into the most profitable directions; it does not have to go directly into exporting or import substitution, for the necessary shift of resources can take place indirectly. More recently D. T. Brash [107] has emphasised the absorption approach, arguing that, given total expenditure, the investment which produces the maximum increase in domestic incomes also produces the maximum benefit for the balance of payments. In particular, if there is some price flexibility, even foreign investment in non-traded goods need not cause balance of payments difficulties. It is clear that each of these views is valid, given appropriate and not unrealistic assumptions. The Vernon Report [4, Ch. 11] generally discussed foreign investment in a balanced way but appeared (through overlooking the effects of past inflation) to overstate its profitability and the balance of payments difficulties to which it may give rise (on this, see Perkins [50]). It advocated moderate limitations on foreign capital inflow, perhaps neglecting possible beneficial effects of foreign investment on exports and imports. The Vernon Report led G. G. Moffatt [115] to produce an elegant algebraic analysis of the conditions determining the effects of capital inflow in a growing economy on the proportion of the private sector of the economy which is foreign-owned and on the balance of payments (though also assuming away effects on exports and visible imports).

The four principal studies of foreign investment in Australia are by

E. L. Wheelwright [117], in the Vernon Report [4, Ch. 11] by Brash [107] and by B. L. Johns [111]. Wheelwright and the Vernon Report assemble and analyse available statistical information with much care. Brash's work is based on surveys of American-owned companies and that of Johns partly on W. P. Hogan's surveys of British-owned companies [110]. The first three discuss at length most of the issues surrounding foreign investment, Wheelwright being much less sympathetic to it than Brash.

The major analytical contribution on the subject has come from visiting economist G. D. A. MacDougall [114]. In an article which is now internationally known, he analysed the gains and losses to the capital–receiving country in terms of a comparative static model, beginning with the assumption that capital receives its marginal social product, and then modifying this assumption step by step, allowing for taxation, for the effects of capital inflow on existing foreign capital, on immigration, on domestic capital formation, on the balance of payments and on the terms of trade, and for external economies and monopoly. Wheelwright [117] has criticised this approach as being too static. MacDougall suggested that the main gains to the capital–receiving country were from taxation on foreign profits. M. C. Kemp [113] added to this by pointing out that there was an optimal rate of tax for the capital–receiving country, this depending on the elasticity of supply of the foreign capital; in fact the country maximises its welfare by behaving like a monopsonist. Corden [109] has related protection to foreign investment, showing how the case for taxing or subsidising capital inflow is influenced by the tariff system and how arguments for protection may be affected by foreign investment effects. Brash [107] has restated and developed the MacDougall approach and produced what is now perhaps the clearest presentation of the main issues involved in the welfare effects of foreign investment.

## VII. *Agricultural Economics*

### A. *Background*

The literature of agricultural economics is, along with that of wages policy, the most impressive branch of Australian economics, though more for its usefulness and its technical competence than its originality. Most of it is positive economics, so that more is known about the rural sector of the Australian economy than any other. The considerable group of agricultural economists also writes widely in the field of production economics, some of them applying linear programming and other mathematical techniques to Australian problems, and they keep current trends and policy issues in the agricultural sector under continuous observation.

Rural products account for about 75 per cent of Australian exports and fluctuations in export income remained to the mid 1950's the main causes of internal fluctuations. On the other hand, while before the war the rural sector accounted for about 22 per cent of gross national product, it now accounts for only 13 per cent, compared with the manufacturing sector contribution of 28 per cent, so that the attention given to agricultural economics in post–war Australia, and indeed the development of the field as a specialty, may represent something of a cultural lag. The importance of agricultural economics may be partly explained by the extent of government intervention in Australian agriculture; there are producer–controlled monopolistic marketing schemes enforced by government legislation for all the main products other than wool and meat. In addition, State governments conduct agricultural extension services. An important role is played by the Federal government's Bureau of Agricultural Economics, an organisation established in 1945 (with J. G. Crawford as first Director) which conducts research of professional quality much of which is published. It is the major source of detailed economic information on Australian agriculture, the main employer of agricultural economists, and has fostered considerably the development of agricultural economics in post–war Australia.

Australian agricultural economics makes more use of econometric methods than Australian academic economic research in general. This may be explained by the fact that most of Australia's agricultural economists have been trained in the United States while most (but by no means all) other economists have been trained in the United Kingdom. It is also arguable that the relatively homogeneous products of agriculture, the larger number of small enterprises in this field and the importance of government intervention have brought forth more statistical material for economists to use than is available for other sectors of the economy.

I am concerned here only with policy discussion. The literature dealing with the role of agriculture in the economy in general, with the effects on agriculture of general economic policies, such as import restrictions or tariffs, and with the changing share of agriculture in the national product, is extensive. In the early 1950's much emphasis was put on the failure of agriculture to expand output sufficiently; there were dire fears that with the growth of domestic consumption exports would decline absolutely. Many of the policy issues as they appeared in the early nineteen fifties have been reviewed controversially by I. Shannon [137], and recent policy issues arising from the "cost–price squeeze" on agriculture have been discussed by F. H. Gruen [127] and in the Vernon Report [4, Ch. 8]. Here I shall review in more detail three

policy discussions which have been prominent in the literature during the early 1960's, namely the protection of the dairy industry, the question of whether there should be a buffer stock scheme for wool, and the issue of northern development.

## B. *Protection of the Dairy Industry*

The dairy industry accounts for 23 per cent of Australia's rural work–force and about 4 per cent of the value of exports. It is protected principally through a "home–price scheme" whereby butter and cheese are sold at monopolistically high prices on the Australian market and are exported at much lower prices; the returns to producers are "pooled," so that they receive prices which are weighted averages of domestic and export prices, domestic consumers in effect subsidising exports. This scheme is supported by tariffs and import restrictions, for otherwise imports would replace the high–priced domestic sales. The price received by producers is further raised by a Treasury subsidy on butter and cheese output, and there are quantitative restrictions on margarine production. Home price schemes operate in a number of other export industries, excluding wool and meat. The degree of protection in relation to value added (effective rates) resulting from home price schemes and other protective devices for the main agricultural products has been estimated by S. F. Harris [129]. The home price scheme as a method of subsidisation was devised in the 1920's and was analysed by economists in the 1930's.

In 1960 was published the report of a committee of enquiry into the dairy industry [138]. Several groups of economists had given evidence and advanced proposals to reduce protection in various ways and to deal with the problem of the low–income dairy farmers. The committee recommended that the home price scheme be retained, but that the Treasury subsidy be reduced until it was eventually abolished, while during the interim period the subsidy should be used to help small farmers and to support "cost–reducing" programmes. In fact the Government did not adopt the committee's recommendations on the subsidy.

The economists' proposals were all more radical. The economic literature on the subject consists of analyses of the Committee's report, of arguments for various proposals, and of analyses which reconcile and compare the proposals and estimate their effects. Downing and Karmel [120] proposed that protection should be reduced to the point where the domestic pooled price is no higher than the import price; assuming that the industry continues to export, this implies a small margin of protection which they justified on the grounds that some of the resources which would be freed through the contraction of the dairy in-

dustry would have to move into other protected industries. But H. R. Edwards and N. T. Drane [125] argued that with this reduction in protection there would be imports, not exports, of butter, so that the import price would in fact represent the free trade price; it seemed to follow that the Downing–Karmel proposal involved the complete ending of protection. Drane and Edwards [121] proposed that each producer be paid a high price for that part of his milk used for butter and cheese sold domestically, and the low export price for that part destined for export. This requires that quotas for domestic sales be established for each producer. The essence of the proposal is that the price received at the margin by producers should be the marginal and not the average return to the industry, so that extra output will not be induced when the marginal cost is above the marginal social return. At the same time incomes of farmers need not necessarily be reduced by this change in the method of protection. Through monopolistic sales on the domestic market consumers would in fact be subsidising quota holders without encouraging exports. F. H. Gruen [126] and R. M. Parish [132] argued that the quotas should be marketable.

The discussion revolved around the following issues. Why should there be a drastic reduction of protection (as suggested by Downing and Karmel) involving a drastic fall in incomes in this industry when no changes were to be made in the protection of other highly protected industries? Does the fact that manufacturing industry is protected provide some justification for a moderate margin of protection for the dairy industry? On the one hand, the alternative use of land would be wholly in non–protected rural industries. On the other, dairying is especially labour–intensive and one might expect a contraction in the dairy industry to lead to some movement of labour into manufacturing. There was much discussion about the virtues and vices of a quota scheme. Do quotas create too many administrative problems? Do the quota proposals not imply a confession of defeat that subsidisation of the dairy industry cannot be ended? How should quotas be allocated and varied, and should they be transferable or not? This latter question involved the same issues as the well–known literature on import quotas. Finally the "low–income" problem was discussed with, perhaps, insufficient realisation that whatever the price of milk there will always be marginal dairy farmers. The literature and issues have been reviewed by H. P. Schapper [136], Gruen [126], and Parish [132]. Parish presented an elegant theoretical analysis using Marshallian methods and the "cost of protection" approach which showed the implications of various methods of protecting the dairy industry under a variety of assumptions. His article is an impressive analytical outcome of the discussion. More generally, the outcome has been that the econom-

ics of the dairy industry have been more thoroughly explored than those of any other Australian industry, with the possible exception of the wool industry.

## C. *Reserve Price Scheme for Wool*

Wool accounts now for about 30 per cent of Australia's export income, and from 1952 to 1960 averaged about 45 per cent. There has been no stabilisation scheme, direct subsidisation or government intervention, affecting the wool industry except during and immediately after the war. World wool prices have fluctuated severely, especially during the Korean boom and slump, though in recent years fluctuations have tended to be modified by the more stable prices of competing synthetic fibres. Talk of establishing a stabilisation scheme, either on an international or a national basis, has been frequent, but has never led to practical results because most wool–growers, who are generally suspicious of government activities, have been opposed. In recent years the new argument has been advanced that the instability of wool prices reduces the attractiveness of wool to buyers and so hurts it in its competition with synthetics. This led to renewed pressure for a national buffer stock scheme (called in Australia a "reserve price scheme"). In the usual Australian way, a semi–amateur committee of enquiry was set up before which economists gave evidence. This committee [139] recommended against a scheme. Shortly afterwards the Wool Board (representing wool–growers) recommended in favour of a scheme but subsequently the proposal was rejected at a referendum of growers. The debate has given rise to an extensive and very professional literature analysing many implications of a reserve price scheme for wool and probably having more general interest because the crucial issues have been discussed in quantitative terms.

A central question has been the matter of "hidden gains and losses." Suppose the reserve price authority makes neither profits nor losses; what are the effects on the incomes of wool–growers? It was argued by A. A. Powell and K. O. Campbell [135] that total returns to growers over a cycle might rise or fall considerably as a result of the scheme, depending on elasticities of demand. They argued that the scheme was in fact a vast gamble with wool–growers' incomes since the precise elasticities were not known. Using plausible figures for elasticities (based on econometric results) the possibility of considerable "hidden losses" was demonstrated. Later Gruen [128] pointed out that the crucial question was whether the slope of the demand curve was flatter or steeper at time of sale compared with time of purchase. He and also Parish [133] pointed out in addition that uncertainty was no argument for or against a scheme; not having a scheme was just as

much a gamble. The variance effects of a scheme were first analysed or the basis of plausible figuring by J. H. Duloy [122]. Prices and in comes of wool growers would, if the scheme were successful, be stabil ised, but the balance of payments would be destabilised (assuming tha: the elasticity of demand for wool is greater than unity). Later Duloy and J. W. Nevile [124] showed by use of an econometric model of the Australian economy that this destabilising effect would not be very large. In an outstanding contribution Duloy [123] simulated the activ ities of a reserve price authority for the Australian wool market during the period 1951/52 to 1963/64. His results yielded the maximum quan tity of capital required to finance the maintenance of various levels of the reserve (minimum) price, given the values of the elasticities and the selling margin. Capital requirements turned out to be very sensitive to these parameters and also to varying reserve prices. Other than with a very high reserve price involving very large capital requirements, the effect on the variance of wool growers' incomes would not be great. He also showed on the basis of his figures that the average level of both growers' incomes and of export income from wool would remain vir tually unchanged.

A whole range of other issues has been canvassed, most of which have been reviewed by A. G. Lloyd [131] who also gives a full bibliog raphy. Would the new authority manage to avoid making losses? This depends to some extent on the trend of prices as well as on the efficiency of the authority in foreseeing price movements. What would be the capital cost? Would the buffer stock authority replace private speculators, and if not, how would it affect their behaviour? Would more stable wool prices really succeed in strengthening the competition of wool relative to synthetics, a proposition rejected by the committee of enquiry but remaining the most popular argument in favour of a scheme? Finally a number of technical questions concerned with the ef fects of a scheme on imperfections of the wool auction market have been discussed at length by Gruen [128] and Lloyd [131].

### D. *Northern Development*

As is well-known, Australia has large areas in the north and west which are very lightly settled, to put it mildly. The main economic ac tivities are the beef cattle industry and mining of various kinds. It has long been part of the Australian mythology that this vast area has great agricultural possibilities and that for defence, moral and other reasons it is necessary to develop this area even though large govern ment subsidies might be required. As one might expect, the contribu tion of economists has been to point out the economic costs of various proposals, to stress that the ability to produce a product is not enough

but that one must inquire also into the expected costs, what the market prospects are, and, as a very first question, whether the same product could not be produced more cheaply elsewhere in Australia. The debate is an old one but has been revived recently. A particular issue of debate has been a proposal for developing an irrigation project to grow rice and cotton in the north–west (the Ord scheme).

The discussion usually has three facets: first there are the essentially non–economic and usually rather doubtful arguments, such as those based on defence or the assertion that Asians "expect" Australia to develop her empty lands and that Australia has a moral obligation to use her northern spaces to grow food; secondly, there are arguments about expected costs and markets, an empirical and forecasting question; and thirdly there are issues of economic reasoning, such as the nature of external economies (whether these are likely to be greater in the north or elsewhere) and whether protection of manufacturing industry justifies some protection for export products produced in the north. The major contribution has been B. R. Davidson's book [119] which analyses the arguments and available statistics on yields of cotton, and so on, and convincingly (to the present author but by no means to everyone) argues against subsidised northern development, especially against the Ord scheme. This gave rise to vigorous controversy. The main advocate for the Ord Scheme has been R. A. Patterson [134], a former government economist concerned with northern development. The discussion has been reviewed by Campbell [118], Lloyd [130], and at length by Mathews [3]. The subject has not produced any major new insights, but has to some extent been a matter of agricultural economists fighting the battle for cost–benefit analysis and economic rationality.

### VIII. *The Vernon Controversy*

Various references have already been made to the Vernon Report [4], in particular its discussions of wages policy, balance of payments issues and tariffs. Let us now consider it in more detail. Apart from the two volumes of the report itself, the reader is here referred to the special issue of the *Economic Record* [146] devoted to reviews.

The report ranges over the main economic policy issues in Australia, is an immensely valuable source of information about the Australian economy and represents the only serious attempt in recent times to look into the future of the Australian economy. As reviewers have pointed out, it is likely to dominate Australian economic discussion and analyses of the economy for years. The central theme is, in the modern fashion, *growth*, the implications of a five per cent growth rate. This emphasis on aggregate growth, and in particular on productivity increase, is relatively new in Australia. In general the emphasis in the past

has been on population growth, and on at least maintaining the capital–labour ratio in the process of growth. The report contains extended discussions of productivity trends, of the problems of productivity measurement, and comparisons of these trends with other countries. (Between 1953–54 and 1962–63 output per person employed is estimated to have increased at 2 per cent or 2.3 per cent a year, not outstanding by international standards.)

The main argument and projections are built around a three–sector growth model, the three sectors being primary (agriculture and mining), secondary (manufacturing), and tertiary (the rest). Particular account is taken of demographic trends, notably the increasing ratio of work–force to population. For details of the model the reader is referred to the extremely interesting Appendix N of the report and for a brilliant critical analysis, to Lydall's review [46]. For various reasons, in particular rising dividend payments on foreign capital, balance of payments difficulties are foreseen. It is also argued that special measures will have to be taken to stimulate saving and investment if the five per cent growth target (which somehow emerges from a projection of past trends) is to be attained. The recommendations include some limit to foreign capital inflow (at a level about equal to recently attained levels), the establishment of an independent economic advisory body, (rather like a permanent Vernon committee, modelled on Canada's Economic Council), and a Special Projects Commission to analyse new development projects. Centralised planning, whether of the physical control or the indicative type, is rejected. Australia, it should be mentioned here, has neither a formal planning authority or department nor a council of economic advisers. Economic policy, and as much planning as the Federal government desires to do within the limits of what the Constitution allows it to do, is firmly in the hands of the Treasury.

The government gave the report an unpleasant welcome. It opposed the establishment of an independent advisory body and a Special Projects Commission, mainly because (as the present author and many others believe) the Treasury wanted no rivals in its influence on overall economic policy. It claimed that the recommendations involved an undue amount of deliberate intervention in the economy and an undue emphasis on the manufacturing sector. The committee was accused of technical errors and fallacies in its main model, in its projections and in certain of its concepts, such as the "general cost disability." For some review of these issues, sympathetic to the committee, see Arndt [140] and for an analysis supporting some of the government criticism, see Lydall [46]. The government probably succeeded in its intention to kill the immediate impact of the report's recommendations and to ensure that it becomes no more than a reference document and a bulky University textbook.

Aside from the tariff discussions (especially the meaning of the "general cost disability") two major technical issues entered the controversy. Firstly, since manufacturing appears to have a higher rate of productivity growth than the tertiary sector, is there a case for stimulating manufacturing in order to raise the measured rate of overall growth? In general the committee's answer (correctly) is negative, but there are hints, upon which the critics have seized, of an excessive sympathy for manufacturing because of its higher productivity growth. Secondly, the committee [4, Ch. 17, App. N] has a somewhat faulty approach (as Lydall [46] has clearly shown) to deriving policy conclusions from projections. First they project supply by sectors, taking into account differential productivity growth and projecting past changes in the sectoral distribution of the work–force; then they project or forecast expenditure, making a variety of assumptions, some quite arbitrary, some based on broad projections of past trends and some on systematic detailed forecasts, as for exports. Not surprisingly, projected supply is found not to match future expected demand and in particular a balance of payments deficit is found to emerge. It is argued, probably correctly, that the eventual outcome will be somewhere in between the supply and demand projections, but rather incautiously that policy recommendations can be derived directly from these two projections. Insufficient allowance appears to have been made for the effects of market forces in reducing or even eliminating possible imbalances, and so lessening the need for policy changes. The outcome depends also on a number of very questionable assumptions used for the expenditure forecast. Furthermore, the committee's method of arriving at the growth rate target from the supply projection is disputable.

Undoubtedly, the controversy has livened up economic discussion in Australia. It is bound to improve general economic understanding and, through having laid a groundwork of basic argument and information, to advance empirical research. These are long-run benefits. But it has also conveyed the impression that economists are seriously divided and that a group of economists (in fact a group including economists) has produced a somewhat faulty document. It also provided an opportunity for the then Prime Minister to attack what he regarded as the pretensions of technical experts. Some of the criticisms have been of the kind that could be made against all econometric forecasting, so that simple econometrics has made an unhappy public debut in Australia.

## IX. Conclusion

This survey has been limited in its scope. There has been no reference to the literature on restrictive practices legislation, on social services policy, on the capital market, on transport policy and various

other subjects. Perhaps the omission of the first is the most serious since proposals for controlling restrictive practices have provoked a prolonged public discussion. (The principal academic economic contributions are by A. Hunter [147], A. D. Barton [141], M. Brunt [142] and J. Hutton and J. P. Nieuwenhuysen [148].) But the main policy issues that have interested Australian economists have been discussed. Furthermore, the academic literature does not give a correct picture of the non–academic policy debates in the press and behind the walls of the Treasury, the Department of Trade and other policy–making institutions. In addition the survey has covered only a part of the Australian professional economics literature, most of which consists of positive economics not directly related to policy issues. Australia has its input–output and its social accounting literature, its econometric models (even before the Vernon Report), its descriptions of industries and industrial structure, of institutions and of trade patterns, and its statistical economic history. The files of the *Economic Record* and the more recently established *Australian Economic Papers* reveal the diversity of interests. Furthermore, Australian economists are part of the international community of scholars and contribute to the general advancement (or, at least, elaboration) of economics. Perhaps the two most important economics books to have been written in Australia and which are not directly related to the Australian environment are Clark's *The Conditions of Economic Progress* [143] and Salter's *Productivity and Technical Change* [149]. A few economists, such as Swan and Salter, have made an international impact on economic theory, the main fields of interest having been growth and trade theory.

One may conclude with two questions. First, why have some fields and not others been thoroughly explored in the policy literature? Secondly, how much influence do Australian economists exert on policy?

Certain fields have been surprisingly neglected in Australia, such as transport policy, problems of urbanisation, criteria for public investment, and analyses of the mainsprings and pattern of industrialisation. Some of these are now getting attention; in particular, Mathews [3] has recently produced a major review of public investment issues. Australian economists have become interested in those topics on which their views may make some impact, especially topics on which, for institutional or other reasons, the Federal government or a Federal authority, such as the Arbitration Commission or the Tariff Board, has had to make economic decisions or recommendations. Committees of enquiry have been a stimulus. Trade and balance of payments issues have received much attention because of the continuing concern of the government with trade policy. The pragmatic Australian approach has

also led to emphasis on short–term issues and on those long–term issues where short–term decisions must be made.

How influential have Australian economists been? There is something of a legend about the influence on economic policy in the early 1930's of a small number of Australian academic economists, notably Giblin, Brigden and Copland. This influence was undoubtedly great, partly because of the obvious need for economic guidance in a situation of crisis and confusion and partly because there were hardly any economists in the public service. (For accounts of Australian economics in the 1930's, and especially the important role of Giblin, see Copland [145] and for a general review of economic thought in Australia 1924–1950, also Copland [144]).

During the war many of the academics went into the public service and some stayed on. The great change compared with the pre–war situation has been that the public service now has economists of its own, as well as numerous administrators with some economic training. The Governor of the central bank since 1949 (Dr. Coombs), the permanent head of the Treasury from 1951 to 1966 (Sir Roland Wilson) and the permanent head of the Department of Trade from its establishment in 1956 to 1960 (Sir John Crawford) have been professional economists. The Treasury has a Financial and Economic Policy Branch consisting mainly of professional economists, and there are economists elsewhere in the Treasury. Within the Department of Primary Industry, the Bureau of Agricultural Economics is a thoroughly professional body. Until 1964 probably more economists proportionately have been in high places in the Australian public service than in Britain. Inevitably the need for the outside academics has been less, though possibly more than the public servants will acknowledge. The academics have in general little close contact with the public service, they are consulted only infrequently, if at all, and there is little interchange. Independent committees on economic issues have been appointed either with no economists on them (taxation, dairying) or perhaps with one (wool marketing). Only two of the five members of the Vernon committee were economists (Crawford and Karmel) even though most of the work was done by a professional, mainly public service, staff. A characteristic Australian anti–intellectualism, and perhaps also inadequacies among the academics, may help to explain this situation. But the argument should not be carried too far. It is clear that economists have made an impact on the Arbitration Commission and on the interests appearing before the Commission, and less perceptibly in some other fields. The Australian emphasis on the practical has led the public service to prefer for many administrative and policy positions a first degree in economics to one in, say, history or law. Thus throughout the public service

one can find a general understanding of the main ideas that economists have to contribute, such as functional finance. And the policy–oriented articles in the *Economic Record* appear to be read in the public service and the business community. But, to get the Australian situation in perspective it would certainly be interesting to make an international comparison of the influence of economists on government.

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